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INDEX PAGE 21

The OIL WEEKLY

FOR THE DRILLING PRODUCING, PIPE LINE INDUSTRY

ROCK BIT DESIGNER

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Standard of the Industry

15 CENTS PER COPY December 23, 1946 VOLUME 124 NUMBER 4

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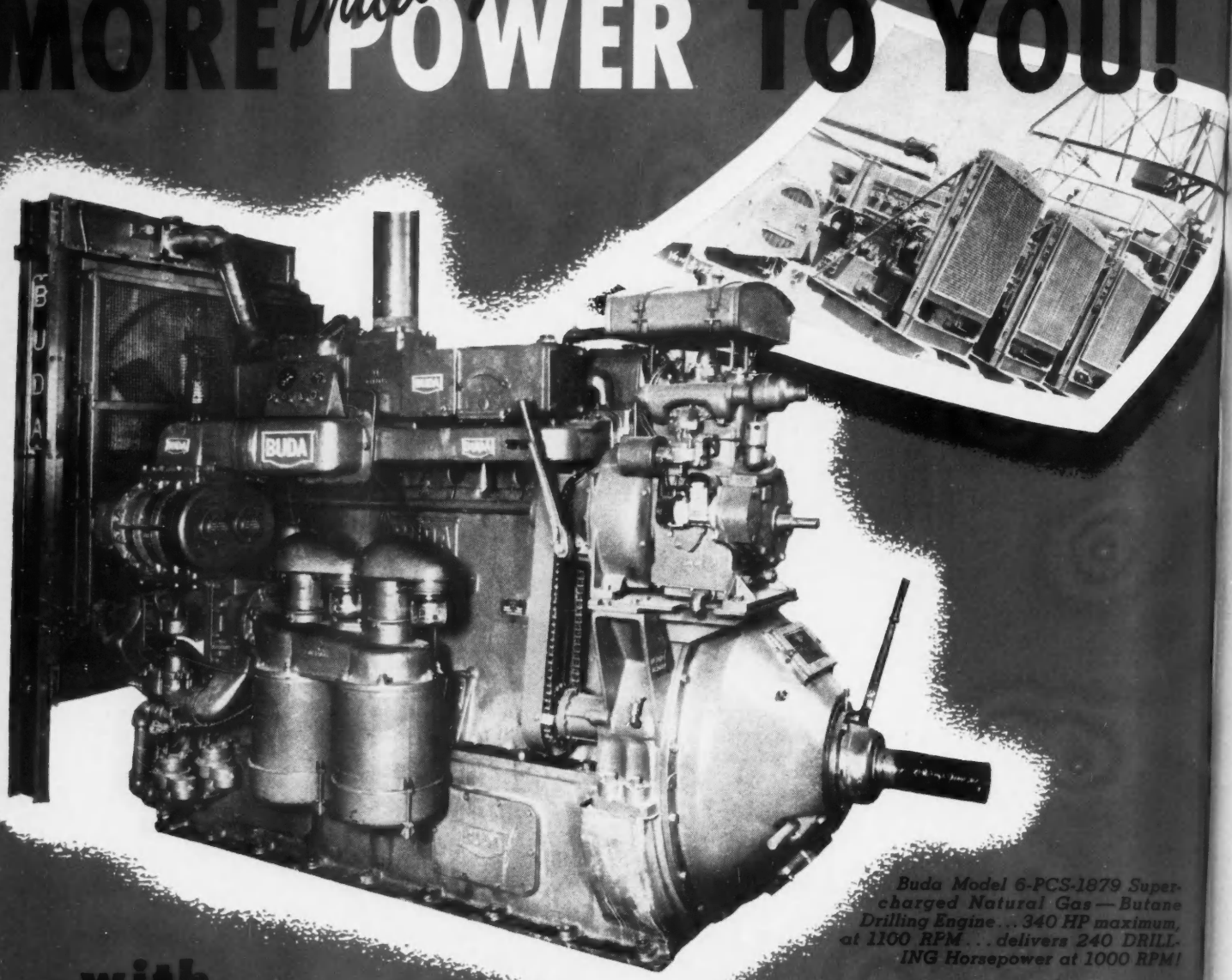

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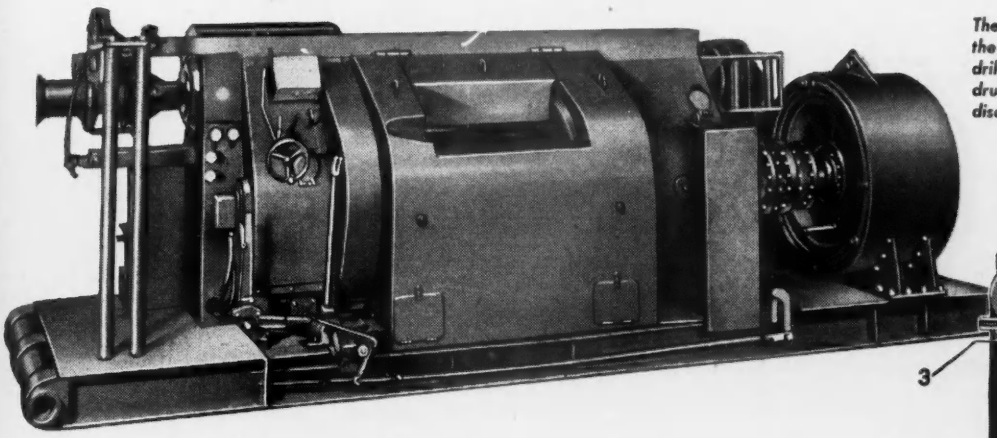
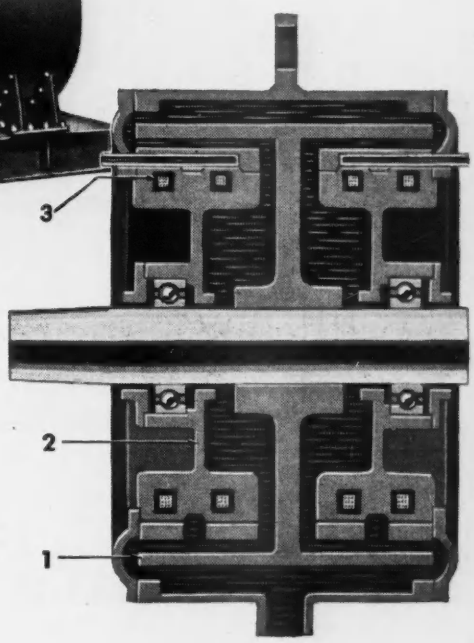


The Dynamatic Brake is mounted on the drawworks base, opposite the driller's side; it is connected to the drum shaft with either a flexible or disconnect coupling.



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The Dynamatic brake consists basically of an iron drum **(1)**, rotating through a magnetic field produced by electro-magnets **(2)** within the drum. Eddy currents produced in the drum exert a pull on the stationary electro-magnets. This force—or braking action—is variable, and controllable by the amount of current passed through the field coils **(3)** in the electro-magnets. There are no brushes, commutators, or slip rings.

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Looking Ahead

WITH THE EDITOR

FURTHER study of the use of shaped charges for penetrating producing zones has involved the use of standard casing sections, encased in grout and cement within oil drums. Charges detonated in these simulated "oil well" conditions enabled the concrete cylinder to be cut open along the line of the hole developed by the charge, and the course of the blast, possible effect on the pores of the surrounding strata, and fracturing of the concrete all were evaluated as a means for checking the effect of the blast under well conditions.

Unlike penetration with a projectile, the shaped-charge method utilizes a jet of extremely high velocity, set up by the detonation wave through an air space purposely left in the charge at the point where it is desired to effect penetration of the surrounding medium. This high-velocity jet, utilized most effectively in the relatively low-velocity bazooka rocket against armored tanks, has been adapted to down-the-hole conditions. Here a relatively small amount of explosive, its force closely restricted and directed, clears a way through casing and into the formation for depths which may be regulated within limits by varying the amount of charge, size and shape of void left in the explosive, and by the type of material used to form the "shape" in the head of the explosive.

The tests indicate use of the shaped charge for opening tight formations of either sand or lime, introducing not only bore holes as collecting channels but also fracture zones which serve as additional or auxiliary channels for production flow.

The latest tests of this method for perforating formations will be described, and results illustrated, in an article by Robert H. McLemore in the next issue of THE OIL WEEKLY.

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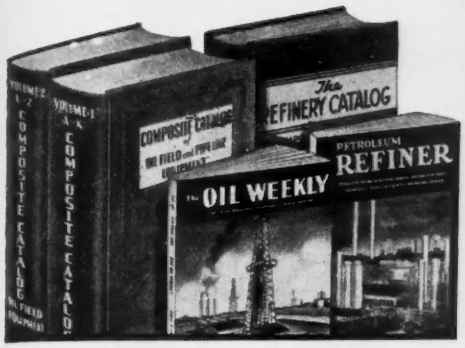

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The OIL WEEKLY

ENGINEERING NEWS STATISTICS

R. L. DUDLEY, President, Publisher A. L. BURNS, General Manager

Contents

DECEMBER 23, 1946

VOLUME 124, No. 4

Technical and Feature Articles

CARTHAGE GAS FIELD DEVELOPMENT 33
By Fred K. Foster

POWER DISTRIBUTION SYSTEMS FOR OIL FIELD PUMPING SERVICE, PART 1 46
By W. C. Bloomquist and J. N. Poore

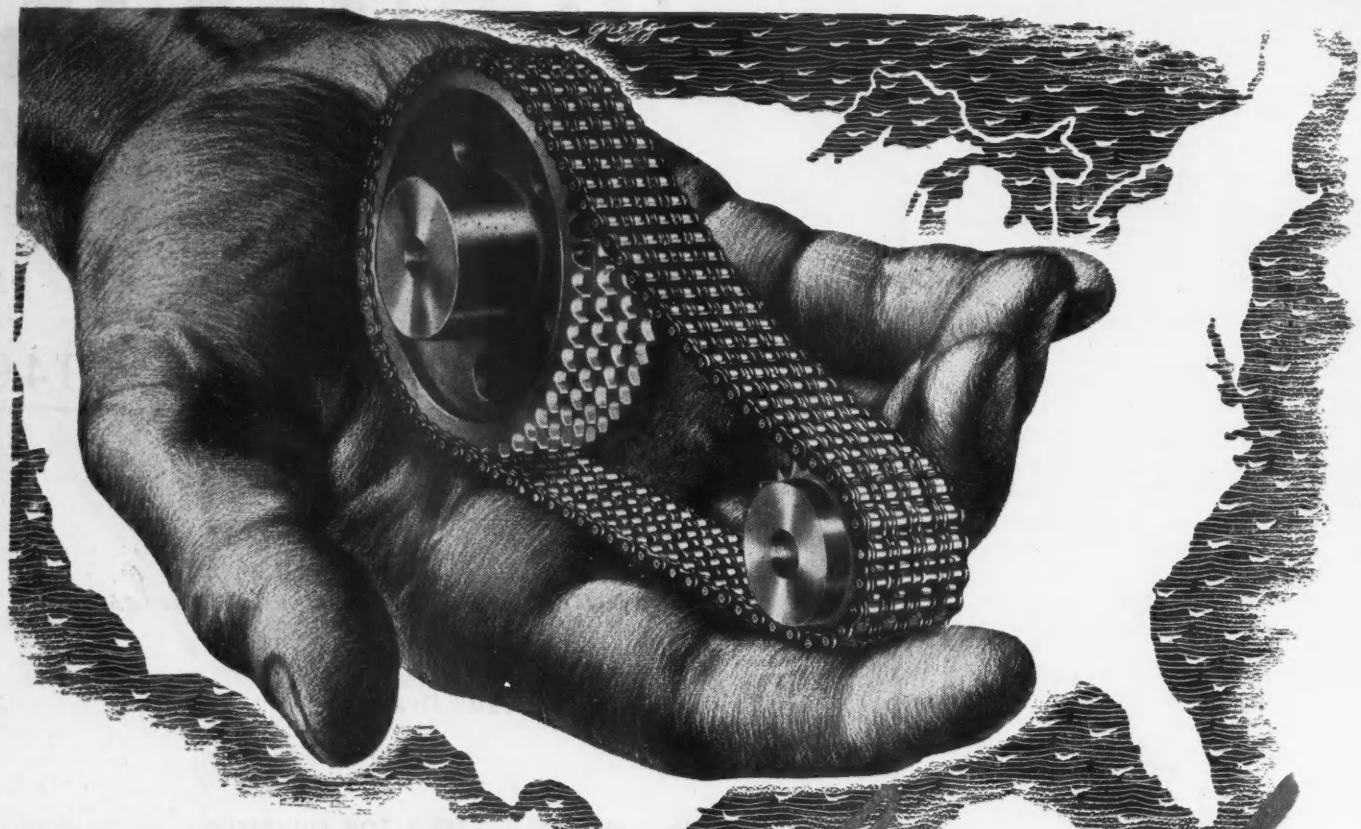
TREATMENT OF GUN-PERFORATED WELLS 52
By Warren J. Jackson

FUNDAMENTALS OF INDUSTRIAL ACCIDENT PREVENTION, PART 13-D 59
By C. L. Hightower

PRODUCTION HINTS 68

News and Departments

LOOKING AHEAD 4
THE OUTLOOK 23
THE CHANGING PANORAMA 25
THE WEEK'S NEWS 26
OIL MAN'S CALENDAR 28
CRUDE PRODUCTION 29
INTERNATIONAL NEWS 30
PIPE LINE NEWS 31
AIME CONVENTION NEWS 31
MARKET TRENDS 71
FIELD OPERATIONS 72
EXPLORATORY COMPLETIONS 88
SQUEAKS FROM THE BULL WHEEL 91
MEN IN THE INDUSTRY NEWS 92
MANUFACTURERS' NOTES 95
ADVERTISERS' INDEX 96



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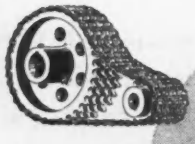

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Industry Needs "Engineer Oil"

WHAT the petroleum industry needs is more "engineer oil."

This oil has become equally important with "discovered oil" and represents billions of barrels of crude which can be recovered through scientific production methods, control of reservoir conditions and energy and through secondary recovery.

Hard economic facts have impelled the engineer up to the front office of many major oil companies where he has attained a place equally as important as that heretofore occupied only by the exploration department.

The facts are obvious.

Producing new oil is costing the industry almost as much as it receives for its product. Since 1900 it has discovered about 50 billion barrels, produced more than 30 billion barrels and has in reserve about 20 billion barrels. However, it is producing more oil than is being found.

In the days of flush fields, producing from comparatively shallow and easily discovered structures the industry was content to recover about 30 per cent of oil in place. Now, in the face of an ever widening gap between profits and costs and confronted with strong competition from abroad, it must be satisfied with not less than 80 per cent of the oil in place.

This additional 50 per cent is "engineer oil." Experience shows it is possible to achieve such recovery.

* * *

Every tradition in the field of business was violated by the OPA act—the tradition of service, of competition, of finding a way to a bigger share of the market by doing a better selling or producing or servicing job.

WILLIAM K. JACKSON, President
U. S. Chamber of Commerce

Reduce the Debt By Lowering Taxes

THE House Ways and Means Committee of the 80th Congress is due to be headed by Representative John Taber of New York who holds this theory regarding taxes and federal income:

Tax reduction will work in a beneficial circle. The less taxes there are, the more income to spend; the more income to spend, the more production demand; the more production, the more workers and more income to tax.

Another Washington official, history records, followed the same principle. Andy Mellon it was who showed the U. S. that the way to reduce national debt was by not *more* taxes but *less* taxes.

So Representative Taber has pretty fair proof that his theory will work.

* * *

We recall a cartoon of many years ago picturing a husky gent in "Echo Valley" yelling "Halloa." Behind a tree not far away, a small boy called out at the proper moment in a faint voice "Halloa," while the visitor marvelled at "Echo Valley."

We were reminded of this cartoon a few weeks ago when Joe Stalin yelled at one end of the world valley that "Churchill is the world's No. 1 war monger!" or words to that effect, while a former cabinet member over here in the USA, behind his tree echoed the words of the husky guy.

Merry Christmas
Happy New Year

THE entire staff of the Oil Weekly not only wishes you a Merry Christmas and a Happy New Year but wishes also to invite Oil Weekly subscribers and advertisers to visit us in our new and greatly expanded quarters at 3301 Buffalo Drive, Houston.

The past year has been one of more than ordinary effort by all of our staff members, and the results have been gratifying to all of us. For the industry as a whole, throughout the world, we wish for the coming year a new record of service to the peoples of the world, and we wish for all engaged in the oil industry the consummation of their hearts' greatest desire.

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THE WEEK'S NEWS

T. S. GEOLOGICAL Survey and Bureau of Mines geophysical groups have been merged. Resources of Alaska to be studied. Story below.

Co-op Tax Studies—No general revision of the tax laws is expected to be undertaken by Congress next year but federal agencies are continuing their studies of the tax advantages enjoyed by cooperative associations. Story below.

Gas Pipe Lines—The Federal Power Commission reports natural gas companies were authorized to expend $193 million on expansion of transmission facilities in 14 months following the war.

Neoprene Plant Offered—The 40,000-ton capacity neoprene plant operated by du Pont at Louisville, Ky., during the war has been put on the block for sale or lease by War Assets Administration.

Lucas Medal Award—Dr. William N. Lacey of California Institute of Technology has been announced as the winner of the 1947 Lucas medal offered by AIME. Page 32.

Petroleum Public Relations—Organization details of the public relations program as contemplated by API are announced. Page 29.

Mother Hubbard Suit—Suddenly revising its position, the Department of Justice plans to keep the "Mother Hubbard" suit alive, while at the same time filing the individual cases which it had planned to substitute for the all-industry proceeding. Page 28.

Anti-Pollution Plan—Efforts for legislation to eliminate water pollution by a three-way federal-state-industry program will be renewed when Congress meets next month.

Continental Shelf Prospect—The Budget Bureau has rejected Interior Department requests for funds for exploration of the continental shelf, and development of its underwater oil resources by the industry is seen as likely, lessening the possibility of formation of a new federal oil reserve. Page 27.

Oil Industry Most Affected By Cooperatives' Expansion

General revision of the revenue law by Congress next year is unlikely in view of the lengthy program of "must" legislation which is being developed, delaying until 1948 any action to bring cooperatives under the corporation-tax provisions.

Several agencies, however, have made intensive studies of the cooperative situation, among them the Treasury, Labor and Commerce departments, and their findings will be available to Congress when the matter comes up.

The departmental surveys indicate that the oil industry is probably the most seriously affected of all by the expansion activities of the cooperative organizations, with further inroads to be expected if the recently-created international petroleum cooperative gets into the world industry in a big way, as planned.

A recent Labor Department study showed that the production of crude and products constitutes more than 50 percent of the entire output of central cooperatives, and that sales of refined products comprised more than 40 percent of the total.

The department's figures disclosed that there were 1500 petroleum associations in 1945 out of a total of 4550 cooperatives, accounting for 910,000 of the country's 1,760,000 cooperative members, and selling $290 million of the total cooperative sales of $657.5 million.

Cooperative production of crude was valued at $1,438,000 and of refined products $30,405,000, a total of close to $32 million out of a total for all cooperative production of $60,578,000.

With cooperative operations representing a sizeable slice of the nation's business, Congress, at the behest of competing industries, has been eyeing them for the past year or two with a view to eliminating some of the tax advantages, originally conferred with an idea of benefiting the farmer but now declared unnecessary.

There is considerable sentiment for the taxation of cooperatives as corporations on such profits as are not distributed to members during the year, and Canada's experience with such a tax plan, adopted this year, will be watched.

The taxing of profits withheld from members, it is argued, would tend to discourage the accumulation of large surpluses with which cooperatives could invade new fields, while at the same time retaining the tax exemptions now enjoyed with respect to normal operations.

Geophysical Research Groups Merged; Study of Alaskan Resources Under Way

An intensive survey of Alaska to determine its material resources and means of coping with the problems presented by the permanent freezing of the ground is being made by the U. S. Geological Survey.

Initiated with a view to finding out, among other things, if the territory contained important reserves of uranium, a party of 56 geologists spent last summer in the field and laboratory analyses of their findings are under way, but details of the work are being withheld for security reasons.

The Survey studies are stressing the importance of developing methods to deal with permanent freezing, necessary to any development, in which Russia is said to be far ahead of the United States. Officials pointed out that lack of knowledge resulted in tremendous waste in the maintenance of the Canol pipe line and other projects in Alaska during the war.

The staff and scope of Geological Survey activities has been expanded by the transfer to it, for absorption into its geophysics section, of the division of geophysical exploration of the Bureau of Mines. The consolidation was part of the reorganization of the Interior Department aimed at the elimination of overlapping activities and duplication of effort with respect to mineral exploration and development programs.

The merger of the two geophysical research groups will permit greater and more effective utilization of the latest techniques by the Survey in its expanding program of mineral exploration, as well as in its related program of field investigations of structural, stratigraphic engineering and economic geology.

R. Joesting of the Geological Survey is geophysicist-in-charge of the consolidated section. F. W. Lee, chief of the former Bureau of Mines division, will henceforth devote his time to a special program of research in instrumentation.

Russia May Participate In Trade Conferences

The Department of Commerce may ask the American Petroleum Institute to designate one of its officials to present views of the American oil industry in the event Russia sends a petroleum expert with its delegation to tentatively-scheduled trade conferences with the United States next spring.

E. C. Ross, chief of the Commerce Department's Russian trade section said that the Russians have indicated a willingness to participate. About $20 million worth of U. S. drilling and refinery equipment during the next calendar year was estimated by Ross as the Soviet demand.

Assistants Named

Texas' Attorney-General-Elect Price Daniel last week announced the appointment of Frank D. Brown, 52-year-old Lubbock attorney, as head of the department's land desk. James D. Smullen of Palestine will continue to head the oil desk for a few months until his successor is named.

Company Exploration of Continental Shelf Likely as Budget Denies Funds

Oil reserves of the Continental Shelf will be developed by private companies operating under leases obtained from the states, late developments indicated.

Harold L. Ickes' vision of a vast federal oil empire under the water off the coasts of the United States flickered into thin air last week when the Budget Bureau reportedly refused to approve any funds asked by the Interior Department for the surveys which the former secretary last year ordered. The department is understood to have asked for about $2 million for initial phases of the work.

The Budget Bureau rejected the plea on the ground that the expenditure was not immediately essential. The Geological Survey likely will scrap its exploration program, and officials are considering the possibility of making studies to the extent permissible on money which may be available from its general fund, probably not more than 10 percent of the proposed expenditure.

These fundamental studies, covering structural and stratigraphic relationships, would be welcomed by the oil industry which, on the whole, believes it can itself carry out the practical work of finding and developing underwater reserves. Magnolia Petroleum Company is drilling one well in 25 feet of water in the open sea, five miles off Louisiana, and is about to undertake two more wells.

Federal vs. State

With the industry already operating off Louisiana and Texas, considered the best possible sources of underwater oil, the postponement of the government's exploration program may mean that it never will be undertaken.

If that is the case, the question of federal vs. state sovereignty may never be raised. The two Gulf states already have announced their claim to sovereignty—Louisiana for a distance of 27 miles and Texas reported preparing to run its limits the same distance—and companies planning explorations off the coast are working under leases from the states.

Geologists believe that aside from the Gulf region, which is considered by far the most promising, oil may be found under the waters off the southeastern coast of Virginia and the northeastern coast of North Carolina, with less probability of discoveries along the Atlantic coast to the northward. The Pacific Coast is far steeper and deep water, beyond the 600-foot limit claimed in the President's proclamation, lies within a short distance of the coast. Such underwater reserves as may exist here can be worked from rigs set on the shore, as is done in California.

It is believed by some that 50 feet is the maximum in which development work can be carried on with present methods and techniques, although wells have been drilled in greater depths in protected waters. Accordingly, it is not unlikely that all activities for the next few years will be limited to those shallower areas, and recoveries from pools lying under 100 to 600 feet of open water are years in the future.

Survey officials, however, believe that it is desirable that information regarding the deeper reserves be compiled for use in some future emergency in which money is no consideration, and are expected to devote their attention now to that phase, leaving it to the industry to develop the close-in oil. The cost of developing such reserves, with the problems raised by storms and the transport of oil to shore, appear to make development prohibitive under normal conditions.

There are no indications that the refusal of the Budget Bureau to approve funds exploration of the Continental Shelf will be contested. Secretary J. A. Krug has never been particularly enthusiastic over the development of a vast federal reserve and is in favor of private operations wherever possible, with a minimum of government interference.

So far, there has been no pressure in Congress on the matter, either, possibly because there are no votes in 600 feet of water.

Max Ball's Appointment Is Formally Announced

Formal announcement of the appointment of Max W. Ball as director of the Oil and Gas Division to succeed Ralph K. Davies was issued by the Interior Department over the week-end.

In announcing Davies' resignation and expressing appreciation of his work, Secretary J. A. Krug said the former OGD head had consented to continue to serve as an adviser. His statement was seen as indicating that he would call Davies back to testify in behalf of the Anglo-American petroleum agreement when hearings are held by the Senate Foreign Relations Committee and possibly would depend upon him for assistance on problems arising in the OGD.

Louisiana Demand Firm

In Louisiana, the demand for crude remained firm for January and February, according to nominations filed at the statewide hearing held last week by the Louisiana Conservation Commission. Company representatives urged that allowables be set at least as high as for the previous month, 444,411 barrels daily, and in no case was a decrease requested.

Named Gas Director

Paul Montgomery, Louisiana state geologist, has been named director of gas conservation for the state, succeeding P. A. Frye, who has accepted the post of director of the State Department of Highways.

Bowes and Hardey Head New Oil-Gas Committee

A National Oil and Gas Committee to foster the general interest of the industries and, particularly, to keep abreast of developments relating to the Natural Gas Act and the FPC's gas investigation has been announced. Headquarters will be in Dallas and co-chairmen are Joseph W. Bowes, of Tulsa, president of Oklahoma Natural Gas Company and president of INGA and B. A. Hardey of Shreveport, La., independent producer and IPAA president.

Members of the committee are: A. C. Mattei, San Francisco; George A. Hill, Jr., Houston; Walter S. Hallanan, Pittsburgh, Pa.; Don Emory, Bartlesville, Okla.; Ralph T. Zook, Bradford, Pa.; R. C. Kay, Amarillo, Texas; Gilbert Mueller, Denver; N. C. McGowen, Shreveport; D. R. Snow, Tulsa; Grady Vaughan, Jr., Dallas; D. P. King, Columbus, Ohio; J. French Robinson, Cleveland, Ohio; Robert Dendee, Colorado Springs; E. L. Rawlins, Shreveport; D. A. Hulcy, Dallas; William Moeller, Los Angeles; Colin C. Rae, Tulsa; Walace Hawkins, Dallas; Hines Baker, Houston; George Bays, Tulsa; Maston Nixon, Corpus Christi, Texas; E. Buddrus, Chicago; J. H. Dunn, Amarillo; Clyde Alexander, Corsicana, Texas, and W. H. Wildes, Dallas.

Increased Recovery Noted By New Shale Treatment

A new and more economical method of treating oil shale which also provides increased recovery has been developed by the Bureau of Mines and is being used in the oil-shale research and development laboratories at Laramie, Wyo.

The new process employs a modification of the Fischer cast-aluminum retort commonly used in low-temperature coal carbonization. More effective than the conventional process heretofore used, the new method takes but one-third of the time, permits more precise control of the operation and increases the volume of oil recovery by 5.4 percent.

The treatment is being used for the assaying of shale for an evaluation of the principal oil-shales of the country.

Texas Statistical Unit Denied by Board's Budget

Funds to support a proposed statistical department for the Texas Railroad Commission's Oil and Gas Division were not recommended by the Board of Control in its budget. The commission had requested $78,600 a year to support such a department.

Otherwise, requests from the division were pretty well followed. The board recommended $801,320 a year as compared with $901,720 requested. Ten inspectors, five engineers, two junior engineers, one senior engineer, and five stenographers were trimmed from the budget by the board. Appropriations for the division for the current biennium amount to $600,131 yearly.

Justice Department Changes Plans, May Work Up Many Anti-Trust Cases

A sudden shift in strategy last week took the Department of Justice into the District of Columbia Federal Court to request an extension of 90 days in which to answer Sun Oil Company's interrogatory in the "Mother Hubbard" case instead of the dismissal of the suit which had been planned.

Word which came from Attorney General Tom Clark's office that the suit was to go on changed departmental intent to announce dropping of the suit in favor of a series of cases to be brought against individual defendants.

Having planned only for the jettisoning of the suit, the department had no alternative but to ask the court for additional time. The extension to March 15, next, will give an additional three months over the five months it already has had to answer Sun's lengthy interrogatory.

Several reasons were advanced for Clark's sudden about-face. One was that Senator Joseph C. O'Mahoney, leader of the Senate drive for tightening anti-trust laws, convinced Clark that it would not be advisable to drop the oil case at this time. O'Mahoney has long been resentful of the handling of Wyoming oil by the industry.

Another suggestion was that President Truman is planning to ask Congress for a record anti-trust division fund, reportedly $2½ million or $800,000 more than for the current fiscal year, and urged the Attorney General to have a generous list of pending cases when the appropriation came up for consideration.

It was pointed out that the administration has a good opportunity to get real enforcement funds as a result of the mounting pressure in Congress for legislation to more adequately protect small businessman and war veterans going into business for themselves. O'Mahoney last week proposed enactment of legislation which would definitely fix the powers, duties and responsibilities of trade associations, labor unions and other "economic" organizations.

"Showing" Said Desirable

Clark may have decided to go on with the present case and at the same time work up the individual suits, so as to have a large number of cases showing when the department's appropriation bill comes up in Congress, when it can be claimed that the oil industry alone presents an anti-trust problem which must be dealt with without delay.

In calling for legislation to control trade and other associations, O'Mahoney demanded that there be no letdown in thorough and effective enforcement of the anti-trust laws.

"We must prevent little business from being regimented by either government or monopoly," he declared. "This objective cannot be accomplished if we continue to give organizations the rights and privileges that belong only to individuals. Unless, by law, Congress lets these organizations know just what they can and cannot lawfully do, there is no way of escaping the steady drift toward big government."

The first of the additional suits, being readied in the Department of Justice, will be filed shortly in California. The suit will be aimed at a major oil company and will be based on charges of exclusive dealings, which allegedly illegally restrict the freedom of retailers to handle products of other companies.

Meanwhile, to add to the confusion, a department press official said that Clark is considering dismissal of the case, dependent upon "a settlement of legal problems" which he did not explain, and might reach a decision within two weeks or so.

This official confirmed reports that the anti-trust division had recommended dismissal, but did not give the reasons.

Northern Natural Tells Of Increased Gas Demand

An indication of the growing demand for gas along the pipe line system in the middle west of Northern Natural Gas Company was presented at the Federal Power Commission hearing in Kansas City last week.

Northern Natural's testimony was the third phase of a lengthy hearing being conducted by FPC on the application of Mid-Continent Gas Transmission Company to construct an 836-mile pipe line from Hugoton, Kan., to St. Paul, Minn. Northern Natural and Cities Service Gas Company intervened in the case and at the same time applied to expand present facilities.

B. R. Bay, Northern Natural president, cited the company's present expansion program, authorized under two permits granted by FPC this year, to enlarge the system's daily capacity from 251 million cubic feet to 325 million cubic feet daily. Barring delays created by material shortages and labor difficulties, he estimated the company could complete most of the $12.5 million expansion it seeks by the end of 1947.

A sharp increase in the use of gas from house-heating was set forth by W. L. Shomaker, superintendent of gas sales for the company.

The hearing has been recessed for the holidays and dates for its resumption in Kansas City, Des Moines and St. Paul have not been set.

Buying Equipment

Joseph Wojcik of the Polish Oil Industry Commission, Krosno, Poland, and Gojko Lucic of the Yugoslavia Oil Division of the Ministry of Mines, Belgrade, Yugoslavia, are in Houston for six weeks. They have just completed a business trip to California. During their stay in the United States they have purchased considerable quantities of drilling and producing equipment.

Texas Allowable January Shows Drop Under December

Purchasers and refiners, noticeably disturbed over prospects of a sharp reduction in Texas allowable for January, have asked that figures remain substantially at the present high rate. Ernest O. Thompson has been elected chairman of the commission for the next two years, a position held by him three times previously. These were the highlights of the statewide proration hearing before the Texas railroad commission last week.

Nominations for January totaled 2,423,960 barrels, a decrease of 14,127 barrels daily from the December figure and 393,960 barrels more than the Bureau of Mines forecast.

January net allowable was fixed at 2,050,584 barrels daily, a decrease of 98,924 barrels from December and 20,584 barrels more than the Bureau of Mines forecast. Almost half of the cut was made in West Texas where storage is full and pipeline facilities are overcrowded. The commission estimates that actual production will be 1,922,422 barrels to which will be added 183,325 barrels distillate and natural gasoline, bringing the state total to 2,105,747 barrels.

The Texas Company, Sun, Crown Central, American Liberty, Republic, States Petroleum, and Sinclair indicated shortages of crude. Humble thought the Bureau of Mines' forecast of a 4 percent increase in consumptive demand during 1947 inadequate and that an additional 50 million barrels of above-ground crude oil stocks will be needed. A company representative said that production will have to be kept at a high rate throughout 1947.

The Texas Company asked that allowables in the West Texas area be reduced to outlet capacity. Sayles Leach, vice president, pointed out that the Bureau of Mines forecasts of demand for Texas crude have been short of actual demand for almost every month of 1946.

Jack K. Baumel of the commission said, in this connection, that during the past 12 years purchasers' nominations have been 15 to 20 percent higher than actual consumptive demand.

The next statewide hearing is set for January 15.

Topics Listed for World Conference on Minerals

"World Mineral Economics," "The Mineral Industry and Atomic Energy" and "A Forecast of Mineral Technology," are some of the topics which will be discussed at the world conference on mineral resources which will be held in New York March 17-22 in connection with the 75th anniversary meeting of the American Institute of Mining and Metallurgical Engineers. Delegates will come from every mineral producing country of the world, and will consider the heavy demands made upon mineral resources by world wars.

Each of the listed topics is expected to have three or four addresses by international authorities.

Organization of Public Relations Program for Oil Outlined by API

Organization of an immediate campaign to enlist the active participation of more than 35,000 individual companies in the oil industry and of every oil man in a nationwide public-relations program has been authorized by the Public-Relations Committee of the American Petroleum Institute.

This action was taken at the first meeting of the newly enlarged committee, John M. Lovejoy, president of Seaboard Oil Company of Delaware, New York, chairman.

Thus was launched a program which has been developed by oil's public relations experts and nationwide activity is expected when all segments of the petroleum industry become interested.

State, local and district committees are planned. District groups will canvass all segments of the industry in their areas in order to have full representation and participation. Company financial support also will be sought. Producing, refining, transporting, and distributing divisions of the oil, natural-gas, natural-gasoline, and supply and equipment branches of the business are included.

Supervision and direction of the program will be the responsibility of the Public Relations Operating Committee, formerly known as the Institute's Advisory Subcommittee on Public Relations. R. T. Haslam, vice president of Standard Oil Company (New Jersey) was reappointed chairman of this group with Franklyn Waltman, Sun Oil Company, first vice chairman, and Ralph Champlin, Ethyl Corporation, second vice chairman.

The Fred Eldean Organization was named as public-relations counsel to manage the program, under the direction of the operating committee.

As part of the initial organization work, members of the operating committee and others will present the details to all petroleum trade associations and to many meetings of industry members. All industry groups, companies, and the trade press will receive full information on the survey and program activities within six weeks.

District organizations, growing out of the activities of the district organizing committees, will be functioning shortly after the first of the year.

The Public-Relations Committee named Philip C. Humphrey, The Texas Company, New York, as a new member; and Haines Finnell of Union Oil Company of California, Los Angeles, and Douglas Campbell of The Pure Oil Company, Chicago, were appointed to replace Reese H. Taylor and L. S. Wescoat of their respective companies. Both Taylor and Wescoat are members of the main committee. W. R. Huber of Gulf Oil Corporation, Pittsburgh, was appointed to the vacancy caused by the death of C. H. Hathaway.

New Ohio, Montana Maps

Possibilities of further discoveries of oil and gas pools in the Berea sand of western West Virginia, eastern Kentucky and southern Ohio are seen by the U. S. Geological Survey officials in a new map of the area, just published, prepared from a study of the drillers' logs of more than 6400 wells.

The map (available at 60 cents, Survey offices in Washington), a western continuation of a similar map of southern West Virginia (Preliminary Map 59), ties in on the north to Preliminary Map 9 and on the northwest to Preliminary Map 29 of the Oil and Gas Investigations series.

The Survey also has published a new map of the Cut Bank oil and gas field and surrounding region of Montana, based on its wartime program to extend the productive limits of known oil fields, showing the productive status as of April 1, last, of more than 1950 wells. Copies of the map, at 25 cents each may be had from Survey offices in Washington, Denver, Casper, Wyo., and Billings.

Crude Oil Production in the United States

(Estimates compiled by THE OIL WEEKLY. All figures indicate daily averages in barrels.)

STATE OR DISTRICT	PRODUCTION IN WEEK ENDED Dec. 21	Dec. 14
Alabama	1,150	1,050
Arkansas	74,000	75,500
California	876,000	871,200
Colorado	36,500	38,900
Florida	270	215
Illinois	201,900	202,700
Indiana	19,500	20,400
Kansas	275,650	279,950
Kentucky	29,900	30,250
Louisiana	403,825	403,325
North Louisiana	93,500	93,000
South Louisiana	310,325	310,325
Michigan	46,750	44,550
Mississippi	85,500	82,250
Missouri	100	100
Montana	23,550	23,500
Nebraska	700	700
New Mexico	103,000	103,000
New York	13,750	13,350
Ohio	8,500	7,500
Oklahoma	371,500	370,800
Pennsylvania	36,250	35,150
Tennessee	35	35
Texas	1,996,065	1,996,065
Tex. R. R. Comm. Districts:		
Dist. 1—S. Central	18,850	18,850
Dist. 2—Lower Gulf Coast	134,775	134,775
Dist. 3—Upper Gulf Coast	422,625	422,625
Dist. 4—S. West	208,800	208,800
Dist. 5—E. Central	34,615	34,615
Dist. 6—E. Texas Field	316,000	316,000
Dist. 6—Rest of N. East	99,375	99,375
Dist. 7-B—W. Central	34,500	34,500
Dist. 7-C—West	27,700	27,700
Dist. 8—West	499,725	499,725
Dist. 9—N. Central	118,000	118,000
Dist. 10—Panhandle	81,100	81,100
West Virginia	7,800	6,200
Wyoming	105,000	105,300
Total United States	4,717,195	4,711,490

* Wells shut-in.

Total stocks, foreign and domestic December 14, as reported by the Bureau of Mines were 226,966,000 barrels.

Big Inch Advisory Group Holds Its First Meeting

Members of the Federal Power Commission's Big Inch Industry Advisory Committee met last Wednesday for a three-day session at which they developed recommendations for allocation among its customer companies of the gas which Tennessee Gas and Transmission Company is moving through the Big Inch pipe lines under its four-month lease from the War Assets Administration.

Tennessee now is moving approximately 100 million cubic feet daily and expects to increase deliveries to around 150 million within the next two or three weeks. Originally it was authorized to deliver the gas to its own customers, pending definite allocations which would make additional gas available to areas needing it, either directly or by displacement, and the committee was set up to give the commission the benefit of the advice of men directly connected with the gas companies interested.

Members of the committee included Gardiner Symonds, president, TGT, chairman; George S. Young, Columbia Engineering Corporation; C. I. Weaver, Ohio Fuel Gas Company; L. L. Tonkin, Hope Natural Gas Company; J. French Robinson, East Ohio Gas Company; W. C. Maguire, Panhandle Eastern Pipe Line Company; D. P. Hartson, Equitable Gas Company; J. G. Montgomery, Jr., United Natural Gas Company; L. E. Ingham, Kentucky Natural Gas Company, and L. B. Schiez, Indiana Gas and Water Company.

Geological Society Issues Extensive Reports of Area

The Shreveport Geological Society, Shreveport, Louisiana, has circulated copies of a publication titled "Reference Report on Certain Oil and Gas Fields of North Louisiana, South Arkansas, Mississippi and Alabama."

This portion of the Society's work, designated Volume I, gives data on 60 fields and includes three stratigraphic sections and an index map of the oil and gas fields and salt domes of East Texas, South Arkansas, North Louisiana, Mississippi and Alabama. Volume II, being printed, will include data of 25 additional fields and will have nine stratigraphic sections.

Feld data covered by the report includes a stratigraphic section, structural map, and information on the producing zone, spacing and allowable, deepest test, proven acreage, production data, oil and gas outlets, etc.

Tax Group Elects

H. W. Pryer of Shreveport, Arkansas Fuel Oil Company, was elected chairman of the Mid-Continent Oil & Gas Association's ad valorem tax committee at the group's annual meeting in San Antonio last week. H. F. Harrington of Houston, The Texas Company, was named vice chairman.

The committee selected Jackson, Miss., as the site for the 1947 tax forum with the date to be set later.

Sinaloa Oil Exploration Contract Is Executed by Mexican Government

The first contract made by the Mexican government with private capital for the exploration and exploitation of oil in Mexico since the famous "expropriation" in 1938 is revealed in the "Diario Oficial" (the official organ of the Mexican Government).

On November 25, 1946, the government entered into a contract with Hilario Millan, Jr., for the prospecting in the state of Sinaloa, located on the west coast of Mexico just south of the state of Sonora. The area consists of 30,000 hectares (74,130 acres) and is situated in the municipality of San Ignacio and the contract is for a maximum of 30 years.

Pertinent terms include 12.5 percent royalty to the federal government. Three wells are to be drilled during the first three years "to the probable depth of the geological formation best suited to the accumulation of petroleum in the zone."

From the fourth year on the contractor must have three commercial wells in production or drill one well per year for each one lacking, or he may drop one-third of the property for each well lacking. Once commercial production is obtained, the productive zone will be determined and one-half of that zone will be incorporated into the National Petroleum Reserve and the Ministry of National Economy will determine the program to be followed for the exploitation of the field as a whole.

Any subcontracts made by the contractor must be paid in a manner absolutely independent of the production which may be obtained and, therefore, the value of the same. Any portion of the contractor's 87.5 percent interest transferred or sold, can only be turned over to Mexican citizens or to companies formed entirely by Mexicans and which do not issue "bearer" shares.

When, in the opinion of the federal executive, public needs require it, the contractor is obliged to sell part or all of his share of the production to the government at a price to be calculated, based on world market quotations.

Only Mexican personnel may be used, but the Ministry may give individual permits for the services of foreigners, only in those cases in which no Mexicans are capable of performing the specialized technical or scientific work involved.

A big problem is what to do with the oil if found. Export permits have been issued Pemex only for the past five years although a number of unexpropriated operators in the present producing fields are ready and willing to export. Nothing is said in the contract about exporting the contractor's share of the oil found. The clause covering the contractor's interest in the oil reads:

"The contractor . . . will be able to extract the total amount of production, which without danger to the deposit, may be withdrawn and may command in his favor 87.5 percent of the amount of the petroleum he may extract, the remaining 12.5 percent remaining at the disposal of the federal government."

Tibu Cretaceous Production Enlarged by Colombian Test

Colombian Petroleum Company's completion of a test in the Tibu field on the Barco Concession greatly enlarges the possibilities of production in the area from Cretaceous limestone. The company's K-21, test on the southwest side of the field, several miles from the nearest production, was drilled to a depth of 10,875 feet, and had some showings in the bottom of the hole just above the basement rocks. However, a series of tests were made, coming up the hole from the casing seat at 10,555 feet, some of which showed oil, and completion has finally been made in a 150-foot perforated interval at 8732-8882 feet. On initial production test it flowed at the rate of 914 barrels of 39-gravity oil daily through a 3/8-inch choke with tubing pressure 920 pounds and casing pressure 1800 pounds. Gas-oil ratio was 1294 to 1, and no water was in evidence.

On the northeast flank, the company's K-28 well, another deep Cretaceous test, has drilled to 10,327 feet, and set casing at 9937 feet for tests of sands showing oil on coring or electric logging. A drill stem test of open hole below casing seat failed to show anything, and operators are preparing to perforate casing up the hole in the upper part of the Uribante formation in the upper part of the Lower Cretaceous and above the Tibu member from which the other two Cretaceous wells in the field produce.

Dutch Field Producing 2100 Barrels Oil Daily

Current production from the Dutch field of Coevorden (now officially renamed Schoonebeek) is 300 tons (about 2100 barrels) daily. This represents a considerable increase from June, when the figure given was 200 tons a day.

This field was discovered in 1942. Production comes from Lower Cretaceous (Valanginian) sandstone at a depth of 2500-2700 feet from anticlinal structures probably associated with buried saltdomes. The proved area of the field is 1900 acres, and there are 15 producing wells.

The Schoonebeek field lies about 20 miles northwest of the German fields at Bentheim, also discovered during the war, and the Netherlands government is seeking frontier rectification to include these fields in Holland. The Schoonebeek crude is being refined at Pernis. This refinery, although much damaged in the war, had recovered its full capacity within a year after the liberation of Holland, and handles a large volume of throughput, mainly from Venezuela.

American Company Given Oil Concession in Sicily

Macmillan Petroleum Corporation of New York has obtained a concession from the Italian government to explore for oil some 13,000 hectares (about 32,000 acres) of land in the Licata, Aragona, Cattolica, and Joppolo Gientascio areas of Sicily. No oil has previously been found in Sicily, but there are very important deposits of asphalt-impregnated Lower Miocene limestones at Ragusa, where the structure is a low anticline.

General oil shortage in Italy has resulted in intensification of the development of available methane resources. Most of the methane comes from wells in the provinces of Rovigo and Ferrara and is distributed for domestic and commercial use. It is planned to extend the present gas-collecting pipelines considerably.

Longest Russian Pipe Line Now Reported in Operation

"Soviet News" has announced completion of all six compressor stations of the Saratov-Moscow pipe line. This line is 500 miles long and has been supplying gas to Moscow since July. Forty million cubic meters (about 1½ billion cubic feet) of gas have been supplied in four months, but with the completion of the compressor stations the gas reaching Moscow will eventually reach a figure of 1,350,000 cubic meters (about 45 million cubic feet) daily.

The gas comes from Permian and Carboniferous strata.

Telayo Concession Well Completed As Producer

Final completion has been made at Pantepec Oil Company of Venezuela and The Atlantic Refining Company's Tucupido 1, on the Pelayo concession, in Venezuela. The well produced at the rate of 257 barrels of 40.8-gravity oil daily on an 8½-hour test through a ¼-inch choke from 7473-88 feet.

The new discovery is about 75 miles west of the Roble field belonging to Pantepec and Creole Petroleum Corporation, and approximately 35 miles northeast of the Mercedes field owned by The Texas Company and Caracas Petroleum Company. The tract on which the well is located comprises 35,000 acres.

Small Show in Spain

Nueva Economia Nacional has announced that a well being drilled in the Province of Burgos has encountered a small seepage of oil at 750 feet. The well is being deepened in the hope that more oil will be found below this level.

The province of Burgos is located in north central Spain and is several hundred miles west of the Province of Lerida where the Socony-Vacuum Oil Company and the Spanish firm of Compania Espanola de Petroleos Scientificas Investigaciones, S. A., are credited with preparing to drill a wildcat test.

FPC Certificate Granted Reynosa for Export Line

The Federal Power Commission Friday announced the grant of a certificate to Reynosa Pipe Line Company for construction of facilities for the exportation to Mexico of up to 50 million cubic feet of natural gas daily for delivery at the Mexican border to Gas Industrial de Monterrey, S. A., for which a permit was issued last June 6.

The certificate authorizes construction of approximately 30 miles of 12-inch pipe line from the La Blanca field, Hidalgo County, Texas, through the North and South Weslaco fields to the north bank of the Rio Grande River, to be fed by field lines from wells in the three fields, and the building of a meter station at the Rio Grande terminus and facilities at the boundary line for delivery of the gas.

Panhandle Is Authorized To Reduce Gas Deliveries

Plans of Panhandle-Eastern Pipe Line Company for meeting any strain upon its capacity which may arise this winter have been approved by the FPC, which will leave the actual curtailments of supply which may be necessary to the distributing companies and the state officials in the affected areas of Missouri, Illinois, Indiana, Ohio and Michigan.

The curtailment plan was devised when Panhandle presented evidence that its transmission system is capable of delivering only 405 million cubic feet daily while estimated firm requirements alone amounted to 440 million cubic feet on a zero temperature day. In the event of an emergency, Panhandle would reduce deliveries to interruptable service consumers by 50 percent and then, if necessary, progressively would cut those consumers to 10 percent of their normal requirements, and reduce deliveries to firm customers to certain individual maximums.

Shell Gathering Line

Shell Pipe Line Company has completed installation of a crude gathering line in the Seeligson field, Southwest Texas, where it is currently producing 5000 barrels of oil daily. The gatherings are being routed via Magnolia Pipe Line Company's trunk line to the latter's Corpus Christi terminal where deliveries are made into Shell's tankers and barges.

Before completion of the gathering line Shell's oil was handled by Sun Pipe Line Company and Humble Pipe Line Company for tanker loadings at Ingleside.

Smith to Succeed Olds

Leland Olds, who has served as chairman of the Federal Power Commission almost continuously for the past seven years, has voluntarily relinquished that post, effective December 31, and will be succeeded by Commissioner Nelson Lee Smith, with Commissioner Richard Sachse as vice chairman.

Smith, appointed to the commission in 1943, served for eight years on the New Hampshire Public Service Commission, and in 1939 was president of the National Association of Railroad and Utilities Commissioners. He came to Washington in 1940 as chairman of the board of investigation and research, a temporary agency established under the Transportation Act of 1940.

Sachse was chief engineer of the California Railroad Commission for eleven years, and prior to the war was director or the California Department of Natural Research. He was appointed to the FPC in 1945.

Line Half Completed

El Paso Natural Gas Company has reached the half-way mark in the construction of a 31-mile 14-inch natural gas line from Phillips Petroleum Company's natural gasoline plant in the Fullerton field, Andrews County sector of West Texas, to its gas-treating plant near Eunice, N. M., where the gas will be available for delivery to California and intermediate market outlets.

Seeks Permit to Export Natural Gas to Canada

Authority to export up to 3 billion cubic feet MCF annually of natural gas to Dominion Natural Gas Company, Ltd., in Canada has been asked of the Federal Power Commission by New York State Natural Gas Corporation. The sale would be made through Penn-York Natural Gas Corporation under a contract entered into last month.

API Chapter Elects

F. J. Mikeska of Kilgore has been elected chairman of the East Texas section of the American Petroleum Institute succeeding N. N. Jones of Gladewater. Other officers elected were T. G. Frick of Greggton, J. N. Miles of Gladewater, and M. E. Zoller of Kilgore, vice chairmen; Kenneth Mills and Phill Lehnhard, Kilgore, secretary-treasurer and assistant, respectively.

Student Society Host To Texas Sections of AIME

By J. E. KASTROP, Staff Writer

THE University of Texas Student Society was host December 18-19 to the first joint meeting ever held which included all the five Texas sections of AIME. In Austin for the two-day meet were representatives from the East Texas, Gulf Coast, North Texas, Permian Basin, and Southwest Texas sections. More than 200 registered the first day, including student society members from both the University and Texas A. & M. College. The technical program, predominantly on gas conservation subjects, included 12 papers, ten of which are digested below.

Valuation of Gas Condensate Reservoirs for Cycling

By WM. H. JUSTICE, Tide Water Associated Oil Company, Houston.

More than 50 percent of the fields being discovered today are of the gas and gas condensate type, proper evaluation of which is a current problem to the oil industry. Most reservoirs discovered through deep drilling are of the latter type and are increasingly important.

A gas condensate reservoir may be described as one in which the condensate content of the produced gas decreases as the pressure of the reservoir is depleted. The following physical properties should be determined: sand thickness, porosity, permeability, flow characteristics, connate water, bottomhole pressure, temperature, reservoir limits, geology of the field and the initial volume of gas in the reservoir. A determination of the fluid composition is very important. A laboratory pressure cell is used in obtaining data from which is drawn a dew-point and iso-thermal retrograde condensation curve. This curve represents the behavior of the fluid in the reservoir upon reduction of pressure

After the above information has been determined, an evaluation is made in which the following important factors are considered: 1) amount of retrograde loss; 2) fluid reserves; 3) extent of the natural water drive of the reservoir; 4) difference in recovery of condensates in the field separator and the modern recovery plant; and 5) the difference in the rate of recovery of condensate by cycling and straight depletion.

Gas Conservation in West Texas

By D. V. CARTER, Chief Petroleum Engineer, Magnolia Petroleum Company, Dallas.

Conservation of natural resources, such as natural gas, may be defined as "the preservation of natural resources for economical use." Our supply of hydrocarbons may be augmented by conservation of gas. In the Texas Permian Basin, the production of gas closely follows the production of oil, and because of the lack of a market it was flared.

In spite of the difficulties, such as a large competitive gas field in the Panhandle and the fact that much West Texas gas is "sour," there are 17 gasoline plants in addition to carbon black plants and recycling plants. At present there are approximately eight pressure maintenance projects in the West Texas area. Until a year ago, there were no gas pipe lines. A 26-inch line is proposed which will handle about 75 percent of the gas now being vented. Over $50,000,000 is to be spent for new gas-processing plants and pressure maintenance projects. The Goldsmith field is to have pressure maintenance projects.

In summary, the following observations are made: 1) True conservation should first permit the maximum economic recovery of all hydrocarbons from the reservoir. 2) The ever-increasing demand upon the industry for petroleum products will necessitate the greatest efficiency of production . . . a

condition that demands production. 3) Despite many wonderful advances in technique and technology, many problems remain to be solved. 4) Differences between the oil and gas businesses are disappearing, and the industry is developing into one of "hydrocarbon" production instead of oil and gas production. Conservation may be simply stated as "common sense."

Corrosion in High Pressure Gas Condensate Wells

By JACK W. WAECHTER, Petroleum Engineering Student, University of Texas.

During the past two years, extensive research programs have been undertaken. Thus far, field and laboratory work has indicated three possible causes of corrosion in high pressure gas-condensate wells: 1) carbonic acid; 2) lower fatty acids identified as formic, acetic and propionic acid; and 3) hydrogen sulfide. Protective coatings on the exposed equipment have prevented corrosion in wells having sufficient concentrations of carbonic acid and fatty acids.

Naphthenic acid dissolved in mineral oil and injected into the well has proven successful in forming a protective layer. Sodium dichromate as an inhibitor to combat corrosion is widely used. This use has been almost exclusively in systems where there was a free excess of air. Kontol 115, produced for the Navy during the war, was found to reduce extreme corrosive conditions in the West Tuleta field, Bee County, Texas. The cycling plant has not experienced emulsion troubles and no clogging of the formation or the tubing. In the Katy field of Waller County, the estimated annual loss due to corrosion is approximately $200,000. Soda ash was dissolved in water and injected into the wells at the rate of one gallon per 1 to 3 million cubic feet appears to be the answer. Various types of baked-on, thermo-reacting and thermo-setting plastics have been used to coat the internal area of the tubing; however, these have not proven too successful. Inhibitors that form protective layers seem to be the most effective. The majority of corrosion problems and successful means of coping with them hinge on the accurate determination and classification of the causative agents.

The Petroleum Engineer As a Supervisor

By THOMAS C. FRICK, The Atlantic Refining Company, Greggton, Texas.

After receiving his degree, the petroleum engineer generally starts to work in theoil field, receiving training which will acquaint him with producing and drilling problems. As yet he is only a novice. His training period is as important to him as internship to a doctor The next logical step is to a job as junior engineer or equivalent. Working under experienced engineers he meets field problems, collects data, makes tests and carries through computations and preparation of reports. From this point, his professional advancement depends on his individual abilities and opportunities offered him by his employers. Sooner or later, supervisory duties come his way.

As a supervisor he must be prepared to deal with "men and their ways," as he has learned to deal with "things and their forces." Supervisory positions bring opportunities to advance in the field of management. For top management positions the most important qualification is the ability to get along with and direct the work of others.

Dr. William N. Lacey To Receive Lucas Medal

Dr. William Noble Lacey has been unanimously selected by American Institute of Mining and Metallurgical Engineers to receive the Anthony F. Lucas Gold Medal for 1947. The award, started in 1936, is given for distinguished achievement in improving the technique and practice of finding and producing petroleum. Lacey is dean of graduate studies of California Institute of Technology and consultant for several corporations. He was cited for "distinguished achievement in directing research work in the fundamentals of hydrocarbon behavior and particularly his application of these fundamentals to oil and gas reservoirs which have led to greater efficiency in oil and gas production from American fields." Last April he received the Hanlon Award for meritorious service to the natural gasoline industry for 1946.

Dr. William N. Lacey

Lacey, a native Californian, holds A.B. and Ch.E. degrees from Stanford University and the degrees of M.S. and Ph.D. from the University of California at Berkeley. He came to "Caltech" in 1916 as an instructor, served in World War I and returned to the school in 1919 as associate professor. He became professor in 1941 and dean of graduate studies in 1946. During World War II he was member of the Advisory Board of the Chemical Corps, U. S. Army.

The Lucas Medal will be formally presented at AIME's 75th anniversary celebration and annual meeting in New York, March, 1947.

Those who have received the medal in the past are: J. Edgar Pew, 1937; Henry L. Doherty, 1938; E. DeGolyer, 1940; Conrad and Marcel Schlumberger, 1941; John R. Suman, 1943; Charles Van Ormer Millikan, 1944; and James Ogier Lewis, 1946.

Every supervisor has five fundamental responsibilities: Equipment, costs, methods, men and policy. He must handle all these to be a good supervisor. Good supervisors have also realized five needs: Knowledge of work, knowledge of responsibilities, skill in instructing, skill in improving methods, and skill in leading.

The Utilization of Residue or Oil Well Gas by the El Paso Natural Gas Company in Connection with Its Texas-California Gas Pipe Line

By W. K. DAVIS, El Paso Natural Gas Company, El Paso.

On May 31, 1946, the Federal Power Commission granted an application to the El Paso Natural Gas Company to construct and operate a 26-inch gas pipe line from West Texas to the California-Arizona border. A construction fund of $42,212,000 was placed in the bank for the completion of the project, which will consist of about 737 miles of 26-inch pipe. Designed to operate at 810 pounds and a maximum of 838 pounds pressure, half the line beyond the main compressor station will have a wall thickness of 0.291 inch while that line on the intake side of the station will have a wall thickness of .281 inch. The line from Dumas, Texas, to Eunice, N. M., will be 24 inches in diameter, and 251 miles long. It will handle 50 million cubic feet of dry gas daily. The field gathering system will consist of 31 miles of 14-inch pipe from the Eunice plant to the Fullerton field, 31 miles of 16-inch pipe from the Jal 1 plant to the Keystone and TXL fields, and 46.5 miles of 14-inch pipe to be laid from the Jal 1 plant to the Pecos River, where it will join the 26-inch line from the Eunice plant.

The first year's operation will utilize 125 million cubic feet daily of 100 percent residue gas, while the second year is contracted for 175 million cubic feet daily. Maximum capacity of the line when complete will be 305 million cubic feet daily, requiring six main line compressor stations and seven field compressor stations having a total of 131,800 horsepower. Desulphurization and dehydration plants are necessary to prepare the gas for shipment.

Gas reserves, down to 4000 feet, have been leased in the Rhodes area of Lea County, New Mexico, for the purpose of storing excess gas during the summer months and making available adequate reserves during winter months without imposing heavy demands on gas reservoirs.

A Reservoir Study of the West Edmond Hunton Pool, Oklahoma

By MAX LITTLEFIELD, L. L. GRAY, and A. C. GODBOLD, Gulf Oil Corporation, Tulsa.

The West Edmond Hunton pool covers portions of Canadian, Logan, Oklahoma, and Kingfisher counties in central Oklahoma and is the largest reservoir producing oil from a limestone in the state. Total area of the pool is about 29,240 acres, development of which is considered to be essentially complete.

Seven hundred and thirty-one wells have been completed in the Hunton reservoir at an average depth of approximately 6900 feet, and have yielded a cumulative oil production in excess of 53 million barrels as of September 15, 1946. In addition to wells completed in the Hunton limestone, there have been 21 wells completed in the Bartlesville sand at approximately 6500 feet which have produced 730,000 barrels of oil. One small producer has been completed in the Cleveland sand at 5700 feet. However, a study of only the Hunton limestone reservoir will be presented here.

The most significant phase of this study concerns the special type of geological core examination that was made in an effort to ascertain the type and degree of porosity in the rock in accordance with lithologic types. Results of this geological study showed the West Edmond pool to be of such complex nature as to appreciably affect the behavior normally associated with homogeneous reservoirs. Recognition of this condition in the reservoir essentially eliminates the prediction of performance histories by rigorous calculation, thus no predictions of gas-oil ratio and bottom-hole pressure behavior are made. The ultimate recovery for the West Edmond pool is estimated to be on the order of 165 million barrels by primary methods, based on 70 percent recovery from the fractures and relatively small recovery from the intergranular porosity which

■ CONTINUED ON PAGE 66

Carthage GAS FIELD DEVELOPMENT

By FRED K. FOSTER

Petroleum Geologist, San Antonio, Texas

THE Carthage gas field, located in Panola County, Texas, 45 miles southwest of Shreveport, was discovered in the latter part of 1936. Development did not get under way to any great extent until 1944, after the completion of Feazel & Kinsey Jordan 1 (Chicago Corporation Carthage Gas Unit No. 1). The productive area now covers between 250,000 and 300,000 acres, far surpassing other U. S. gas condensate reserves.

The structure is a broad domal anticline with little or no faulting. Gas and condensate are produced primarily from the Pettit zones of Lower Cretaceous age between 5800 and 6200 feet in depth. To date, 238 wells have been drilled, of which 222 were completed for gas condensate production, 16 were dry holes, and 20 are drilling.

The current September 1, 1946, daily average allowable from the field is approximately 1000 Mcf per well. Condensate production averages for the field approximately 14 barrels per million cubic feet of gas.

DISCOVERY of the Carthage gas field late in 1936 caused little excitement as the first wells did not find much porosity and for that reason development was slow. Completion of the Feazel & Kinsey Jordan 1 near the northwest side of the town of Carthage and approximately 6 miles west of the discovery well in November, 1943, really started development on a large scale by finding a good thickness of porosity in both the Upper and Lower Pettit zones.

Plate No. 4 is a reference map with the well numbers corresponding to the list of wells in Table 1. On all plates the wells carry the same key numbers.

Panola County has produced gas and oil for a number of years, in its northeast part near Bethany, from shallow sands (to 3500 feet), but this report does not include this early development. Intention of this report is to include only the later developments insofar as they pertain to the Carthage gas condensate field, which are those zones producing below the massive anhydrite.

The Carthage gas field is entirely within the limits of Panola County, Texas, centering around Carthage, the county seat. U. S. Highway 79 crosses the county in an east-west direction and U. S. Highway 59 crosses it in a north-south direction. The Santa Fe Railroad is the only railroad serving the area.

History and Development

In 1936 Glassell & Glassell, who had leases on the Frost Lumber Company lands, started Frost 1, Mary S. Potts survey, approximately six miles northeast of Carthage. Shortly thereafter Magnolia Petroleum Company, which had some leases nearing the expiration date, started Hull 1, T. Applewhite survey, 3½ miles southwest of Frost 1. Frost 1 was completed in the Hill zone 4880-90 in September, 1936. Within a few weeks Magnolia's Hull 1 was completed in the Lower Pettit for 2300 mcf and 20 barrels of condensate per million cubic feet of gas. In 1937 Magnolia drilled Hull 2 to 8713 feet, making the final completion in the Lower Pettit.

The following year The Texas Company drilled T. C. Adams 1, Thomas Cox survey, and on top of the Bethany High. This test was carried to 11,303 feet, having encountered salt in the bottom of the hole after penetrating a normal thickness of the Cotton Valley formation and a somewhat shortened section of Smackover lime. The test was completed as a small gas well from the Travis Peak formation, there being little or no porosity in the Pettit.

From 1938 until 1943 few wells were drilled. Until the Feazel & Kinsey Jordan 1 (Chicago Corporation Carthage Gas Unit 1) was completed in both the Upper and Lower Pettits for an initial production of 112,000 mcf and 79,000 mcf, respectively, development was almost at a standstill.

During 1944, 1945 and the first half of 1946 more than 200 wells were drilled, the greater number of these being dual completions. Reference is here made to Table 1, which shows the producing zones and initial production of all the wells in the field.

The common practice in well completion has been set to 5½-inch casing to the bottom of the hole, cementing with sufficient cement to force it well above the massive anhydrite, then perforating opposite the selected zones of porosity. Two and one-half inch tubing is set with packer so that the Lower Pettit is produced through the tubing and the Upper Pettit through the casing. In some instances seven-inch casing and three-inch tubing have been used. Sometimes dual completions have been made in one Pettit zone and the Travis Peak or one Pettit zone and the Hill.

Three extraction plants are now serving the field, the Arkansas-Louisiana Gas Company plant with a capacity of 25,000 mcf per day; United Gas Company plant with a capacity of 150,000 mcf per day, and The Chicago Corporation plant with a capacity of 124,000 mcf per day. At the present time United Gas Company, Arkansas-Louisiana Gas Company and Lone Star Gas Company pipe lines serve the field. However, many wells do not have pipe line connections.

Topography and Drainage

The topography of Panola County consists, for the most part, of gently rolling hills and broad flat valleys with a maximum relief of 200 feet. The Sabine River traverses the county from northwest to southeast. This stream, together with its tributaries, drains the entire area. At flood stage many wells are often isolated for several weeks at a time. The sandy soil, especially during the rainy season, makes for impassable roads and necessitates the building of plank roads to well locations.

Stratigraphy

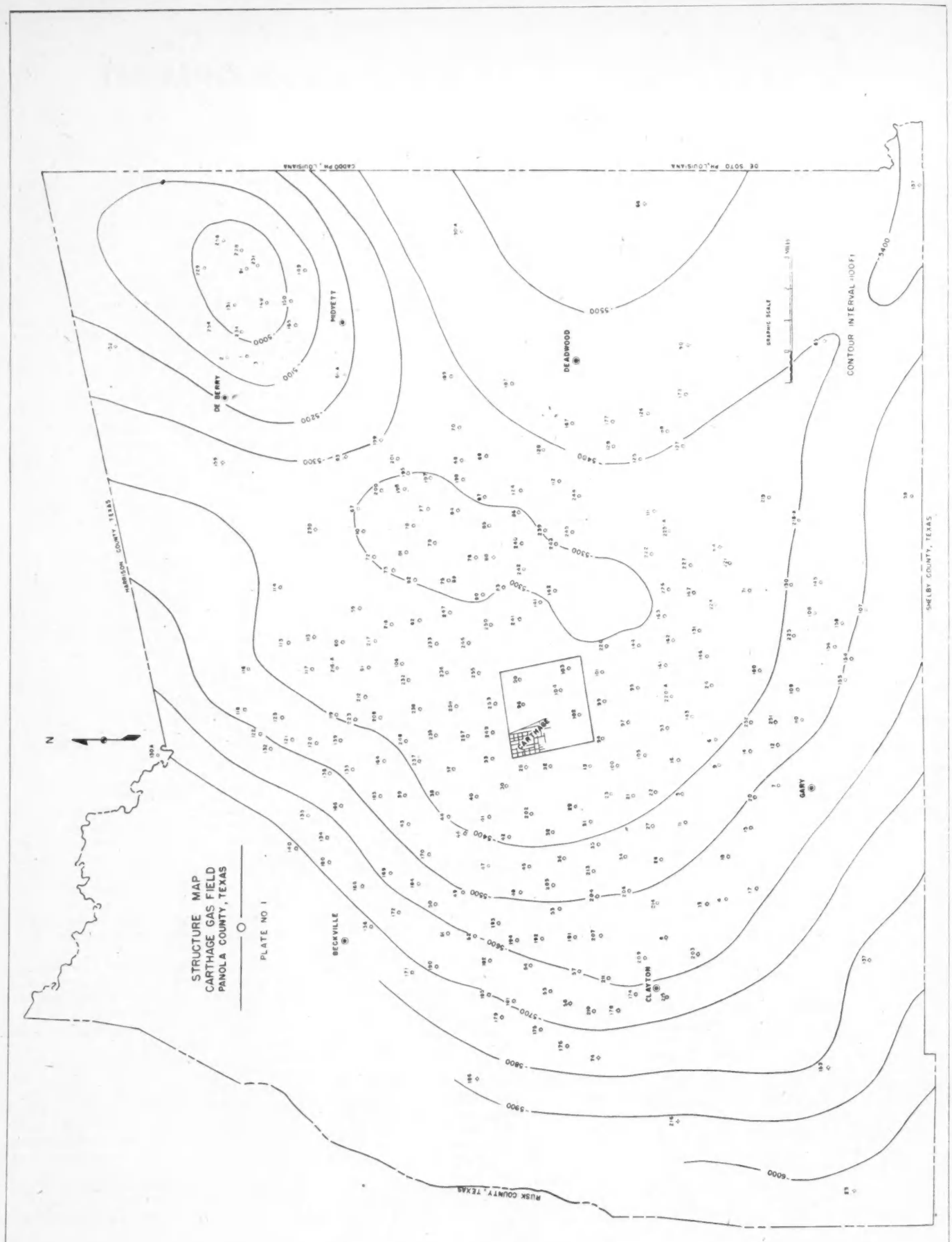
The penetrated stratigraphy of the Carthage gas field includes a vertical section of a little more than 11,000 feet, ranging from Wilcox (Eocene) through Smackover (Jurassic). The following brief descriptions are based on a study of electrical logs, well cores, cuttings, and observations made during drilling operations on many of the wells in the field.

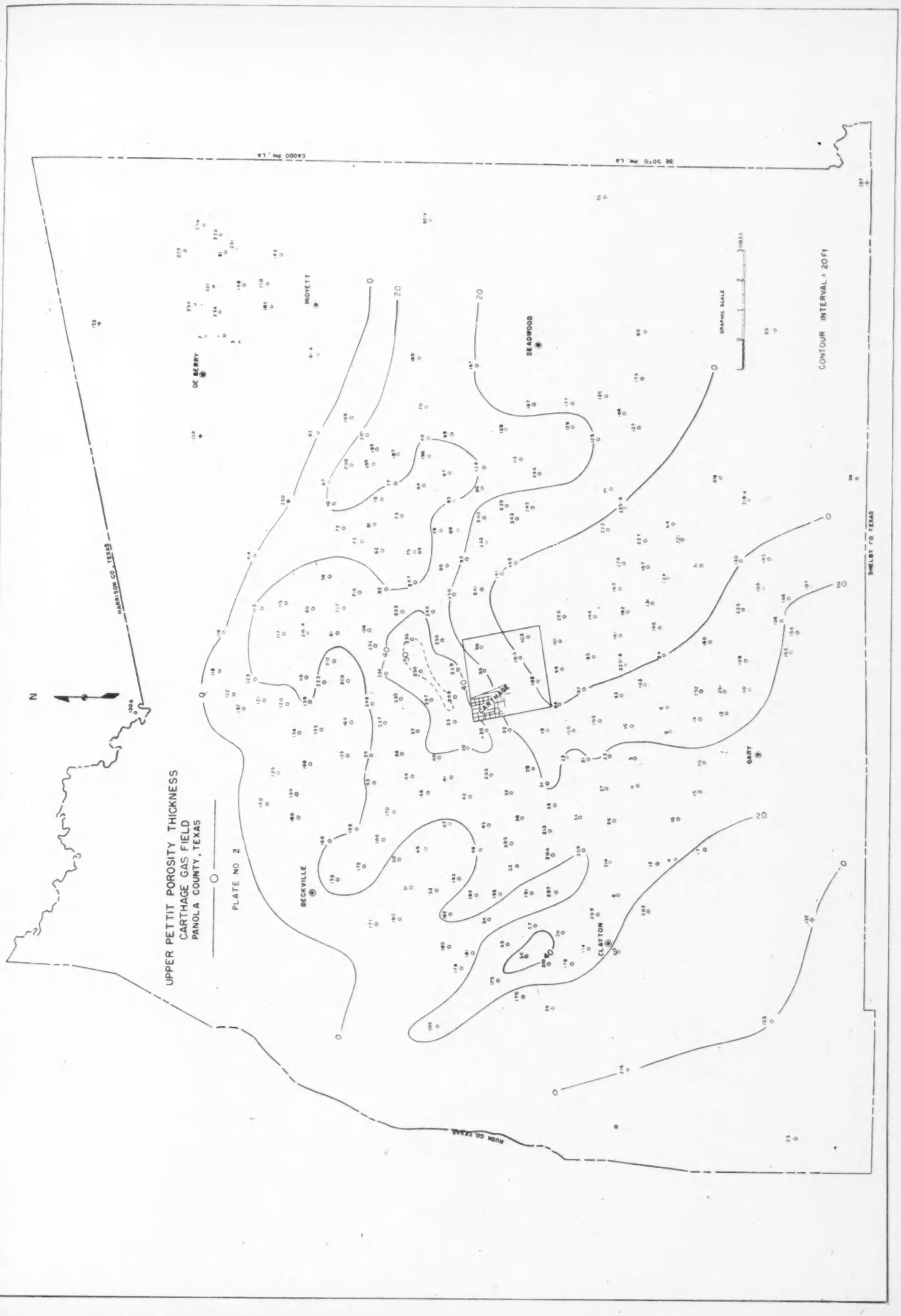
Wilcox: Exposures in the Carthage gas field are easily recognizable as the Wilcox formation of Eocene age, and are composed of light gray to reddish loose sands and clays. On the Bethany High and in the vicinity of The Texas Company's T. C. Adams 1 the Midway comes to the surface in a few isolated exposures, but over all the remainder of the Carthage gas field only beds of Wilcox are found at the surface.

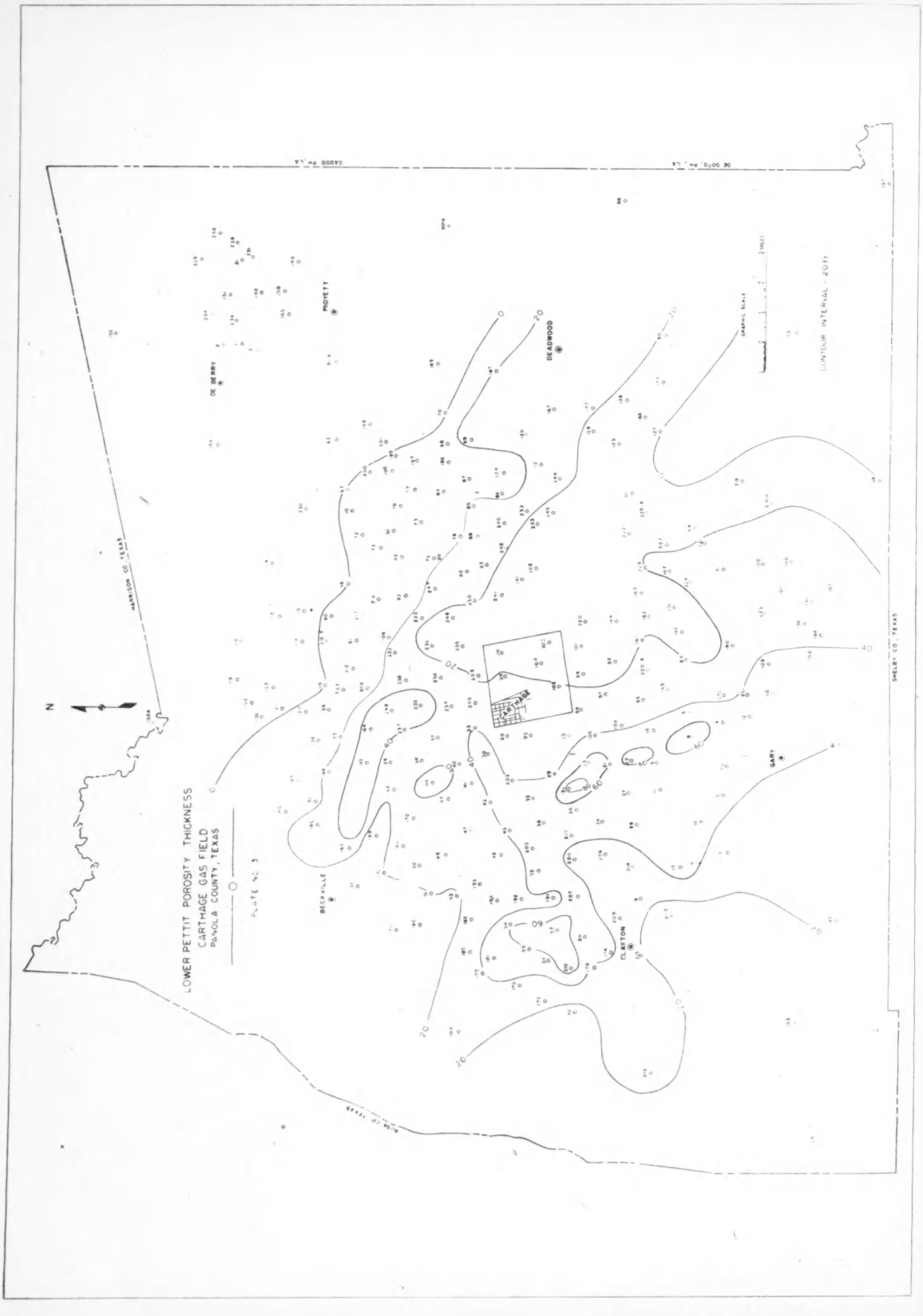
Midway: The Midway of Eocene age underlies the Wilcox formation and consists almost entirely of black to dark brown shales with a thickness of approximately 650 feet. It lies unconformably upon beds of Upper Cretaceous age.

The Gulf Series: The Gulf Series, which includes all the beds of Upper Cretaceous age in this area, although important in view of the past development in the Bethany area, is only briefly mentioned here since it has no particular bearing

■ CONTINUED ON PAGE 40
ALSO SEE TABLE AND MAPS ON PAGES 34, 35, 36, 37, 38


STRUCTURE MAP
CARTHAGE GAS FIELD
PANOLA COUNTY, TEXAS
PLATE NO 1
CONTOUR INTERVAL 100 FT.
GRAPHIC SCALE
N
HARRISON COUNTY, TEXAS
SHELBY COUNTY, TEXAS
RUSK COUNTY, TEXAS
DE SOTO PH., LOUISIANA
CADDO PH., LOUISIANA
DE BERRY
MIDYETT
DEADWOOD
GARY
BECKVILLE
CLAYTON
CARTHAGE
5000
5100
5200
5300
5400
5500
5600
5700
5800
5900
6000


UPPER PETTIT POROSITY THICKNESS
CARTHAGE GAS FIELD
PANOLA COUNTY, TEXAS
PLATE NO 2
CONTOUR INTERVAL = 20 Ft
GRAPHIC SCALE
N
HARRISON CO. TEXAS
SHELBY CO. TEXAS
RUSK CO. TEXAS
DE BERRY
MOYETT
BEADWOOD
CARTHAGE
GARY
BECKVILLE
CLAYTON


LOWER PETTIT POROSITY THICKNESS
CARTHAGE GAS FIELD
PANOLA COUNTY, TEXAS
PLATE NO. 3
CONTOUR INTERVAL - 20 FT.
GRAPHIC SCALE
N
CARTHAGE
DEADWOOD
PROVETT
DE BERRY
BECKVILLE
CLAYTON
GARY
HARRISON CO. TEXAS
SHELBY CO. TEXAS

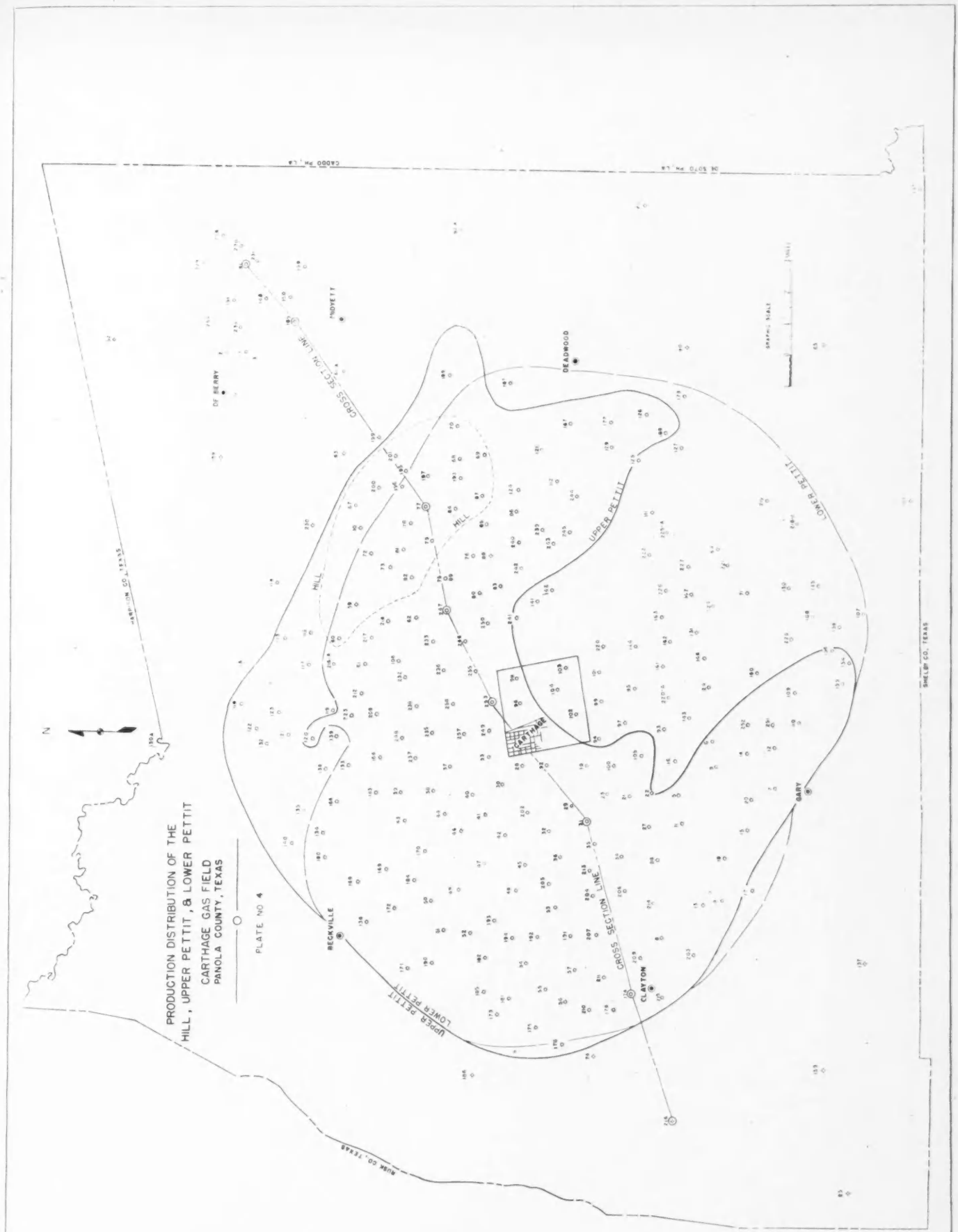

PRODUCTION DISTRICTION OF THE
HILL, UPPER PETTIT, & LOWER PETTIT
CARTHAGE GAS FIELD
PANOLA COUNTY, TEXAS
PLATE NO 4
N
CROSS SECTION LINE
DEADWOOD
INDYETT
DE BERRY
BECKVILLE
CLAYTON
GARY
CARTHAGE
HILL
UPPER PETTIT
LOWER PETTIT
SHELBY CO. TEXAS

TABLE 1

Well Data of the Carthage Gas Field, Panola County, Texas

Map Key No.	COMPANY AND WELL	Hill Porosity Feet	Initial Prod. MCF	Upper Pettit Porosity Feet	Initial Prod. MCF	Lower Pettit Porosity Feet	Initial Prod. MCF	Travis Peak Feet	Initial Prod. MCF	Remarks Total Depth	Elev., Feet
	ANDRADE:										
1	Belle 1	..	.....	..	.....	..	.....	20	14,000	6174	337
2	Roberson 1	..	.....	9	.....	21	.....	34	82,000	6118	309
3	Sharp 1	..	.....	..	.....	..	.....	..	.....	Drilling	369
	ARK-LA. GAS CO.										
4	Bailey 1	..	.....	..	.....	..	.....	..	.....	Drilling	243
5	Bowen 1	..	.....	23	35,000	55	90,000	..	.....	6252	306
6	Boynton 1	..	.....	19	8,800	46	129,000	..	.....	6220	316
7	Brannon 1	..	.....	..	.....	..	.....	..	.....	Drilling	243
8	Clark 1	..	.....	33	7,000	24	3,000	..	.....	6603	378
9	H. Clark 1	..	.....	12	.....	62	140,000	..	.....	6240	283
10	Cummings 1	8	32,000	32	6,500	16	.....	12	.....	6384	289
11	Daniels 1	..	.....	20	18,000	51	10,600	..	.....	6473	334
12	Daniels B-1	..	.....	15	7,000	52	14,000	..	.....	6600	239
13	Daniels C-1	..	.....	21	.....	43	130,000	..	.....	6410	330
14	Daniels D-1	..	.....	16	50,000	54	52,000	..	.....	6605	243
15	Hardin 1	..	.....	26	SW	43	44,000	..	.....	6356	294
16	Hudson 1	..	.....	14	.....	56	116,000	..	.....	6605	313
17	Langford 1	..	.....	18	SW	24	4,200	..	.....	7012	300
18	Morris 1	..	.....	25	35,000	42	30,000	..	.....	6600	327
19	Owens	..	.....	..	.....	..	.....	..	.....	Drilling	286
20	Pate 1	..	.....	25	67,000	50	165,000	..	.....	6263	242
21	Pirkle 1	..	.....	20	55,000	55	165,000	..	.....	6606	273
22	Pirkle B-1	..	.....	23	.....	61	255,000	..	.....	6241	346
23	Pirkle C-1	..	.....	22	5,800	65	220,000	..	.....	6210	313
24	Prior 1	..	.....	..	.....	20	52,000	..	.....	6175	289
	BELCHER ET AL:										
25	Hudman 1	..	.....	..	.....	45	.....	..	.....	7075 D. & A.	392
	BRITISH-AMERICAN:										
26	Carthage Gas Unit 111	..	.....	24	22,800	44	122,000	..	.....	6697	367
27	Dennard 1	..	.....	15	.....	44	135,000	..	.....	6625	323
	THE CHICAGO CORP.:										
28	Carthage Gas Unit 1	..	.....	42	112,000	31	79,000	..	.....	6200	325
29	Carthage Gas Unit 2	..	.....	26	91,000	39	50,000	..	.....	6472	310
30	Carthage Gas Unit 3	..	.....	40	123,000	43	36,000	..	.....	6170	309
31	Carthage Gas Unit 4	..	.....	18	124,000	85	86,000	..	.....	6198	296
32	Carthage Gas Unit 5	..	.....	27	26,800	46	107,000	..	.....	6256	329
33	Carthage Gas Unit 6	..	.....	49	52,500	39	104,000	..	.....	6140	283
34	Carthage Gas Unit 7	..	.....	22	50,000	50	107,000	..	.....	6235	308
35	Carthage Gas Unit 8	..	.....	28	118,000	37	98,000	..	.....	6225	330
36	Carthage Gas Unit 9	..	.....	21	160,000	53	90,000	..	.....	6256	316
37	Carthage Gas Unit 10	..	.....	32	48,000	22	80,000	..	.....	6106	319
38	Carthage Gas Unit 11	..	.....	24	25,500	31	62,000	..	.....	6195	308
39	Carthage Gas Unit 12	..	.....	21	4,400	22	72,000	..	.....	6163	283
40	Carthage Gas Unit 13	..	.....	39	41,000	27	70,000	..	.....	6127	316
41	Carthage Gas Unit 14	..	.....	35	10,600	32	12,000	..	.....	6174	307
42	Carthage Gas Unit 15	..	.....	31	160,000	40	41,000	..	.....	6248	371
43	Carthage Gas Unit 16	..	.....	22	2,100	22	60,000	..	.....	6220	249
44	Carthage Gas Unit 17	..	.....	31	125,000	56	88,000	..	.....	6235	337
45	Carthage Gas Unit 18	..	.....	27	45,000	46	7,800	..	.....	6260	362
46	Carthage Gas Unit 19	..	.....	34	162,000	26	41,000	..	.....	6270	355
47	Carthage Gas Unit 20	..	.....	..	.....	..	.....	..	.....	Location	375
48	Carthage Gas Unit 21	..	.....	22	.....	26	41,000	..	.....	6330	376
49	Carthage Gas Unit 23	..	.....	10	44,000	24	14,000	..	.....	6400	361
50	Carthage Gas Unit 24	..	.....	..	.....	..	.....	..	.....	Location	301
51	Carthage Gas Unit 25	..	.....	14	1,400	20	18,000	..	.....	6440	324
52	Carthage Gas Unit 26	..	.....	19	70,000	20	13,000	..	.....	6374	286
53	Carthage Gas Unit 27	..	.....	21	23,500	45	50,000	..	.....	6345	334
54	Carthage Gas Unit 28	..	.....	19	19,000	58	96,000	..	.....	6445	360
55	Carthage Gas Unit 29	..	.....	28	40,000	59	80,000	..	.....	6475	340
56	Carthage Gas Unit 30	..	.....	41	.....	44	19,500	..	.....	6470	341
57	Carthage Gas Unit 31	..	.....	39	2,800	67	70,000	..	.....	6480	389
	COLOMBIAN CARBON CO.:										
58	Baldwin 1	..	.....	..	.....	..	.....	..	.....	6506 D. & A.	243
	CONTINENTAL OIL CO.:										
59	Burnett 1	12	12,500	25	16,500	..	.....	..	.....	9309	216
60	Burnett 2	10	366,000	24	45,000	11	.....	..	.....	6447	217
61	Burnett 3	..	.....	23	144,000	10	3,650	..	.....	6398	220
61-A	Osborne 1	..	.....	..	.....	..	.....	..	.....	Location	320

Map Key No.	COMPAN AND WELL	Hill Porosity Feet	Initial Prod. MCF	Upper Pettit Porosity Feet	Initial Prod. MCF	Lower Pettit Porosity Feet	Initial Prod. MCF	Travis Peak Feet	Initial Prod. MCF	Remarks Total Depth	Elev., Feet
62	Thompson 1	..	.....	20	8,000	14	30,000	..	.....	6301	246
63	Werner Sawmill 1	..	.....	..	.....	..	.....	..	.....	6432 D. & A.	279
	CROW DRILLING CO.:										
64	Frost 1	..	.....	..	.....	..	.....	..	.....	6315 D. & A.	287
65	Frost A-1	..	.....	..	.....	..	.....	..	.....	6332 D. & A.	194
	DANCIGER OIL CO.:										
66	Tatum 1	..	.....	25	.....	10	.....	..	.....	6512 D. & A.	293
	DELTA CO.										
67	Christian 1	7	.....	26	.....	17	.....	..	.....	6545	319
68	Cooke 1	5	74,000	20	.....	19	13,500	15	.....	6335	233
69	Guill 1	7	30,000	30	.....	30	30,000	..	.....	6422	272
70	Ragler-Lewis 1	10	170,000	23	14,800	..	.....	34	.....	6504	316
	DEVONIAN OIL CO.										
71	Bleakley 1	..	.....	..	.....	21	155,000	..	.....	6403	238
	FEAZEL & KINSEY										
72	Burnett 1	8	57,000	15	13,000	16	.....	..	.....	6076	210
73	Burnett 2	6	.....	10	35,000	..	.....	..	.....	5703	210
74	Cartwright 1	..	.....	13	SW	15	SW	..	.....	6543	310
	GLASSELL & GLASSELL										
75	Frost Lbr. 1	..	.....	7	2,500	..	.....	..	.....	6002 No Schlumberger	216
76	Frost Lbr. 2	..	.....	30	31,000	20	5,500	..	.....	6606	216
77	Frost Lbr. 3	8	140,000	20	.....	19	19,000	..	.....	6035	209
79	Frost Lbr. 5	10	300,000	15	26,800	17	.....	..	.....	6395	211
80	Frost Lbr. 6	..	.....	30	52,500	20	35,600	..	.....	6303	236
81	Frost Lbr. 7	5	26,500	12	50,000	13	.....	..	.....	6429	211
82	Frost Lbr. 8	11	145,000	14	118,000	12	.....	..	.....	6045	211
83	Frost Lbr. 9	4	9,200	..	.....	26	101,000	..	.....	6460	224
84	Frost Lbr. 10	8	190,000	14	7,000	8	.....	..	.....	6500	210
85	Frost Lbr. 11	3	.....	20	157,000	21	163,000	..	.....	6532	209
86	Frost Lbr. 12	..	.....	33	.....	16	22,000	..	.....	6333	207
87	Frost Lbr. 13	6	425,000	15	50,000	17	.....	..	.....	6440	225
88	Pierce & Chesbro 1	..	.....	..	.....	..	.....	..	.....	5881 Lost Hole	206
89	Williamson 1	..	.....	20	44,000	..	.....	..	.....	5684	215
	GULF REFINING CO.										
90	Pierce Chesbro 1	..	.....	..	.....	..	.....	..	.....	5455 D. & A.	233
90-A	Wallace	..	.....	..	.....	..	.....	..	.....	Location	...
	HOLCOMB & THOMASON										
91	Crenshaw 15	..	.....	..	.....	12	.....	10	25,000	6111	328
	HUMBLE O. & R. CO.										
92	Banks 1	..	.....	21	200,000	38	220,000	..	.....	6495	334
93	Brown 1	..	.....	11	.....	22	208,000	38	47,000	6420	285
94	Coleman 1	..	.....	..	.....	36	135,000	15	2,600	6440	275
95	Donald 1	..	.....	..	.....	17	110,200	11	8,200	6430	251
96	Gholston 1	..	.....	20	10,500	21	12,800	..	.....	6505	299
97	Holmes 1	..	.....	..	.....	22	139,000	9	.....	6402	268
98	Jones 1	..	.....	15	141,000	15	25,000	..	.....	6417	245
99	Owens 1	..	.....	..	.....	11	115,000	..	.....	6475	293
100	Pirkle 1	..	.....	18	34,500	40	84,000	..	.....	6353	279
101	Prior 1	..	.....	..	.....	16	90,000	..	.....	6449	281
102	Sealy 1	..	.....	..	.....	21	75,000	..	.....	6490	302
103	Thomas & Wood 1	..	.....	..	.....	18	158,000	13	8,800	6470	302
104	Woolworth 1	..	.....	..	.....	14	104,000	12	1,500	6450	298
	HUMBLE-SUN										
105	Davis 1	..	.....	25	44,500	60	160,000	..	.....	6500	322
	HUNT OIL CO.										
106	Allison 1	..	.....	30	59,000	..	.....	12	165 bbls. oil	6500	232
107	Hill 1	..	.....	..	.....	..	.....	..	.....	Drilling	337
108	Motley 1	..	.....	..	.....	..	.....	..	.....	Drilling	305

Map Key No.	COMPANY AND WELL	Hill Porosity Feet	Initial Prod. MCF	Upper Pettit Porosity Feet	Initial Prod. MCF	Lower Pettit Porosity Feet	Initial Prod. MCF	Travis Peak Feet	Initial Prod. MCF	Remarks Total Depth	Elev., Feet
	KERR-McGEE-PHILLIPS										
109	Naomi 1	..	.....	17	14,000	44	640,000	..	.....	6505	239
110	Panola Unit C 1	..	.....	..	.....	..	.....	..	.....	Drilling	388
	(Rogers Lacy)										
111	Borders 1	..	.....	7	.....	11	9,000	6	20 bbls. oil	6150	204
	(W. H. Mitchell)										
112	Boren 1	4	.....	27	80,000	29	12,500	..	.....	6128	211
113	Brown 1	..	.....	22	51,000	..	.....	20	7,000	6453	226
114	Burnett 1	..	.....	..	.....	..	.....	8	7,900	6509	221
115	Burnett 2	..	.....	25	160,000	..	.....	10	2,150	6510	225
116	Burnett 4	..	.....	..	.....	..	.....	13	6,500	6477	224
117	Burnett 7	..	.....	23	23,000	..	.....	..	.....	6427	224
	(Lillard & Griffith)										
118	Burnett 8	6	.....	13	26,800	..	.....	15	4,300	6285	228
119	Cameron Lbr. 1	..	.....	22	182,000	..	.....	15	26 bbls. oil	6507	233
120	Cameron Lbr. 2	..	.....	18	50,000	18	1,800	..	.....	6528	247
121	Cameron Lbr. 3	..	.....	16	25,000	..	.....	..	.....	6502	318
122	Cook 1	5	.....	15	78,000	..	.....	..	.....	7010	299
123	Cook 2	6	.....	20	10,750	..	.....	10	45 bbls. oil	6227	264
124	Frost 1	..	.....	23	175,000	5	.....	..	.....	6400	208
125	Frost 1	..	.....	..	.....	24	95,000	..	.....	9006	206
	(W. H. Mitchell)										
126	Frost 3	..	.....	25	13,500	37	120,000	..	.....	6233	213
	(W. H. Mitchell)										
127	Frost 4	..	.....	10	SW	26	48,000	..	.....	6103	202
	(W. H. Mitchell)										
128	Frost 5	..	.....	..	.....	..	.....	..	.....	Drilling	296
129	Frost Cottle 1	..	.....	21	68,000	15	17,000	..	.....	6220	203
	(W. H. Mitchell)										
130	Frost-Parker 1	..	.....	..	.....	25	82,000	..	.....	6178	260
130-A	Key 1	..	.....	5	.....	15	.....	..	.....	Drilling	223 Harrison Co.
131	Kyle 1	..	.....	..	.....	15	10,300	..	.....	6152	269
	(W. H. Mitchell)										
132	Major 81	..	.....	15	26,000	..	.....	..	.....	6396	303
133	Metcalf 1	..	.....	16	70,000	11	15,000	..	.....	6270	275
134	Parker 1	..	.....	16	5,300	18	2,500	..	.....	6570	264
	(A. Lillard)										
135	Parker 2	..	.....	..	.....	..	.....	..	.....	Drilling	249
	(A. Lillard)										
136	Roquemore 1	..	.....	25	84,000	16	6,000	..	.....	6818	333
137	Temple Lbr. 1	..	.....	..	.....	22	SW	..	.....	6887 D. & A.	381
138	Turner 1	..	.....	20	175,000	..	.....	..	.....	6608	236
139	Richardson 1	..	.....	20	180,000	..	.....	..	.....	6509	255
140	Holt 1	..	.....	19	15,000	..	.....	..	.....	6568	250
	MAGNOLIA PET. CO.										
141	Hull 1	..	.....	..	.....	10	2,300	..	.....	5958	232
142	Hull 2	..	.....	..	.....	12	1,450	..	.....	8713	222
143	Kyle 1	..	.....	..	.....	..	.....	..	.....	.....	258
	McALESTER FUEL OIL CO.										
144	Hunt 1	..	.....	..	.....	10	2,500	..	.....	9014	288
	MID-CONTINENT PET. CO.										
145	DeBerry 1	..	.....	..	.....	13	103,000	..	.....	6252	313
146	Holmes 1	..	.....	..	.....	18	67,000	..	.....	6412	234
147	McDaniel 1	..	.....	..	.....	20	39,000	..	.....	6404	245
	MID-STATES OIL CO.										
148	Floyd 1	..	.....	..	.....	..	.....	14	37,000	6000	283
149	Marvin Gully 1	..	.....	..	.....	..	270	..	.....	6203	293
150	Midyett-Gully 1	..	.....	..	.....	4	.....	12	27,000	6290	328
151	Roquemore 1	..	.....	..	.....	9	.....	10	10,000	6144	287
	MUTEX OIL CO.										
152	Furrh 1	..	.....	..	.....	..	.....	..	.....	6175 D. & A.	377

Map Key No.	COMPANY AND WELL	Hill Porosity Feet	Initial Prod. MCF	Upper Pettit Porosity Feet	Initial Prod. MCF	Lower Pettit Porosity Feet	Initial Prod. MCF	Travis Peak Feet	Initial Prod. MCF	Remarks Total Depth	Elev., Feet
	OHIO OIL CO.										
153	Britton	..	.....	..	.....	31	Show of oil	..	.....	7000 D. & A.	362
	PEWITT										
154	Carthage Gas Unit 2	..	.....	29	.....	34	140,000	..	.....	6300	339
155	Carthage Gas Unit 3	..	.....	29	D.S.T. SW	18	.....	..	.....	6304	329
156	Carthage Gas Unit 4	..	.....	30	330,000	32	35,000	..	.....	6305	388
157	Rushing 1	..	.....	..	.....	..	.....	..	.....	5110 D. & A.	197
	PEWITT & SUN										
158	Smith-Miller	..	.....	..	.....	35	6,000	..	.....	6465	292
	PLACID OIL CO.										
159	Greer 1	..	.....	..	.....	..	.....	..	.....	6845 D. & A.	335
160	Rogers 1	..	.....	13	6,100	27	45,000	..	.....	6209	223
	PURE OIL CO.										
161	Hancock 1	..	.....	..	.....	21	80,000	15	.....	6450	291
162	Kyle 1	..	.....	..	.....	15	33,000	..	.....	6475	294
163	Poss 1	..	.....	..	.....	10	.....	5	.....	6121	288
	A. D. ROBERTS										
164	Roberts 1	..	.....	12	Not Perf'ted	45	103,000 53,500	..	.....	6200	240
	ROBERTS & MURPHY										
165	Johnson 1	..	.....	..	.....	..	.....	..	2,500	6300	314
	RUDCO OIL & GAS CO.										
166	Hicks 1	..	.....	16	.....	22	22,500	20	45 bbls.dist.	6602	278
	SKELLY OIL CO.										
167	Baker 1	4	.....	10	.....	38	28,500	..	.....	6500	261
168	Beall 1		.....	20	14,300	38	7,100	..	.....	6467	318
169	Beall-Norman 1		.....	20	36,957	14	9,338	..	.....	6371	296
170	Blankenship 1		.....	25	92,000	26	36,000	..	.....	6193	269
171	Daniels 1		.....	13	40,300	12	7,273	..	.....	6546	343
172	Eddy 1		.....	24	39,000	20	15,500	..	.....	6700	313
173	Frost A-1		.....	15	.....	14	5,100	..	.....	6185	203
174	Harrell 1		.....	28	.....	44	44,000	..	.....	6503	384
175	Harris 1		.....	39	7,000	29	SW	..	.....	6539	327
176	Houston-Wills 1		.....	11	21,000	32	SW	..	.....	7000	329
177	Jones 1		.....	12	.....	26	10,600	..	.....	6505	238
178	Kersh 1		.....	28	35,000	39	25,000	..	.....	6519	365
179	Mangham 1		.....	19	70,000	38	37,000	..	.....	6508	305
180	Matthews 1		.....	8	3,900	25	58 bbls. oil	..	.....	6715	291
181	Powers 1		.....	17	61,000	42	5,600	..	.....	6459	278
182	Ross 1		.....	21	69,000	34	81,000	..	.....	6410	279
183	Shivers 1		.....	17	6,100	41	91,000	..	.....	6212	241
184	Shivers-Peoples 1		.....	26	43,000	24	22,500	..	.....	6290	255
185	Spencer-Thompkins 1		.....	16	55,433	25	10,114	..	.....	6479	294
186	Thompkins 1		.....	23	SW	30	SW	..	.....	718 D. & A.	359
187	Werner Sawmill 1	10	.....	20	.....	20	27,300	..	.....	7156	295
188	Werner Sawmill 2	..	.....	12	1,118	10	17,116	..	.....	6404	208
189	Werner Sawmill D-1	3	.....	33	480,000	..	.....	..	.....	6240	299
190	Whitfield 1		.....	19	49,200	16	16,500	..	.....	6404	273
	R. E. SMITH										
191	Copeland 1		.....	19	80,000	39	56,000	..	.....	6360	374
192	Hopper 1		.....	20	41,000	37	62,500	..	.....	6390	385
193	Parker 1		.....	19	.....	47	37,000	..	.....	6340	337
194	Pierce 1		.....	23	16,000	28	1,450	..	.....	6350	331
	SMITH & TURNER										
195	Bird 1	6	5,500	..	.....	..	.....	..	.....	4997	297
196	Bird 2	8	126,000	25	380,000	15	.....	..	.....	6125	264
197	Dunaway 1	..	24,000	..	.....	..	.....	..	.....	4959	224
198	Dunaway 4	6	.....	13	.....	18	7,000	..	.....	6120	215
199	Panola Dev. Co. 1	..	.....	..	.....	..	.....	..	.....	6434 D. & A.	306
200	Panola 2	..	.....	12	17,500	..	.....	..	.....	5040	325
201	Panola 3	6	39,000	25	.....	..	.....	..	.....	6210	247

TABLE 1—Continued

Well Data of the Carthage Gas Field, Panola County, Texas

Map Key No.	COMPANY AND WELL	Hill Porosity Feet	Initial Prod. MCF	Upper Pettit Porosity Feet	Initial Prod. MCF	Lower Pettit Porosity Feet	Initial Prod. MCF	Travis Peak Feet	Initial Prod. MCF	Remarks Total Depth	Elev., Feet
	SOUTHERN PROD. CO.										
202	Allison 1			35	56,000	40	30,000	13		6431	341
203	Boles 1			20		50	158,000			6356	335
204	Brown 1			24	350,000	32	75,000			6275	362
205	Brewster 1			19	W	50	232,000			6275	315
206	Gillaspie 1	8		20		32	80,000			6650	348
207	Harrison 1			16	700	42	245,000			6340	377
208	Hicks 1			16	10,000	19	110,000			6480	246
209	Lawrence 1	7		29	19,000	27	6,500			6745	374
210	A. J. Reed			34	11,500	63	60,000			6530	347
211	W. M. Reed 1			36	1,400	46	16,000			6365	369
212	Roberts 1			13	70,000	6		12	64	6415	231
213	Soapes 1			21	31,000	51	122,000		bbls. oil	6500	340
214	Wiltcher 1									Drilling	334
215	Davis 1			16		52	79,000			6475	369
	SOUTHPORT PET. CO.										
216	Scharnagel 1					30	SW			6917 D. & A.	381
	STANOLIND										
216-A	Burnett 1									Location	221
217	Unit 11			42	47,000	38	45,000			6455	218
218	Unit 12			34	27,500	12	94,000			6449	218
	SUN OIL CO.										
218-A	Burns 1									Location	299
219	DeBerry 1					6	6,250			6506	248
220	Hall 1					12	10,500			6391	248
220-A	Kyle 1									Drilling	311
221	McLendon 1					22	3,033	20	15,333	6394	208
222	Neal 1					17	7,500			6375	226
223	Neal A-2				220,000					6469	231
224	Neal B-1									Drilling	235
225	Travis Williams 1					24	60,000			6237	264
225-A	Gena Williamson 1									Location	211
226	C. W. Williamson 1					21	70,000				274
227	Woolworth 1					18	No Potential given				239
	THE TEXAS OIL CO.										
228	Adams 1										
229	Brumble 13										
	THOMASON CO.										
230	Silas-Hudson 1										
	UNION PROD. CO.										
231	Adams 1										
232	Allison 1										
233	Black 1										
234	Cavin 1										
235	Chadwick 1										
236	Collins 1										
237	Fite 1										
238	Hudson-Johnson 1										
239	Hull A-1										
240	Hull A-2										
241	Hull A-3										
242	Hull A-4										
243	Hull A-5										
244	Hull A-6										
245	Hull A-7										
246	Hull B-1										
247	Lily 1										
248	Mangham 1										
249	Moore 1										
250	Morgan 1										
251	Owens 1										
252	Shaw 1										
253	Smith-Bird 1										
254	Steele 1										
255	Thompson 1										
256	Werner 1										
257	Whitaker 1										
258	Youngblood-Roe 1										

Map Key No.	COMPANY AND WELL	Hill Porosity Feet	Initial Prod. MCF	Upper Pettit Porosity Feet	Initial Prod. MCF	Lower Pettit Porosity Feet	Initial Prod. MCF	Travis Peak Feet	Initial Prod. MCF	Remarks Total Depth	Elev., Feet

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feet there occurs a great thickness of very soft, porous, oolitic limestone known as the Gloyd. Drilling time in this formation often goes as low as one minute per foot. This limestone shows no production in the Carthage field, but is productive in the Logansport field about 20 miles southeast.

The James limestone in the Carthage area with a thickness of 170 feet is made up of a series of hard crystalline limestone beds separated in part by thin shale partings. This limestone shows no porosity in this field but serves as a very definite marker on which to map the subsurface structure. The base of this lime was used as a datum bed for Plate 1.

The Pine Island shale lying between the James lime and the Pettit limestone has a thickness of 150 feet and consists entirely of hard dark gray to black, slightly calcerous shale.

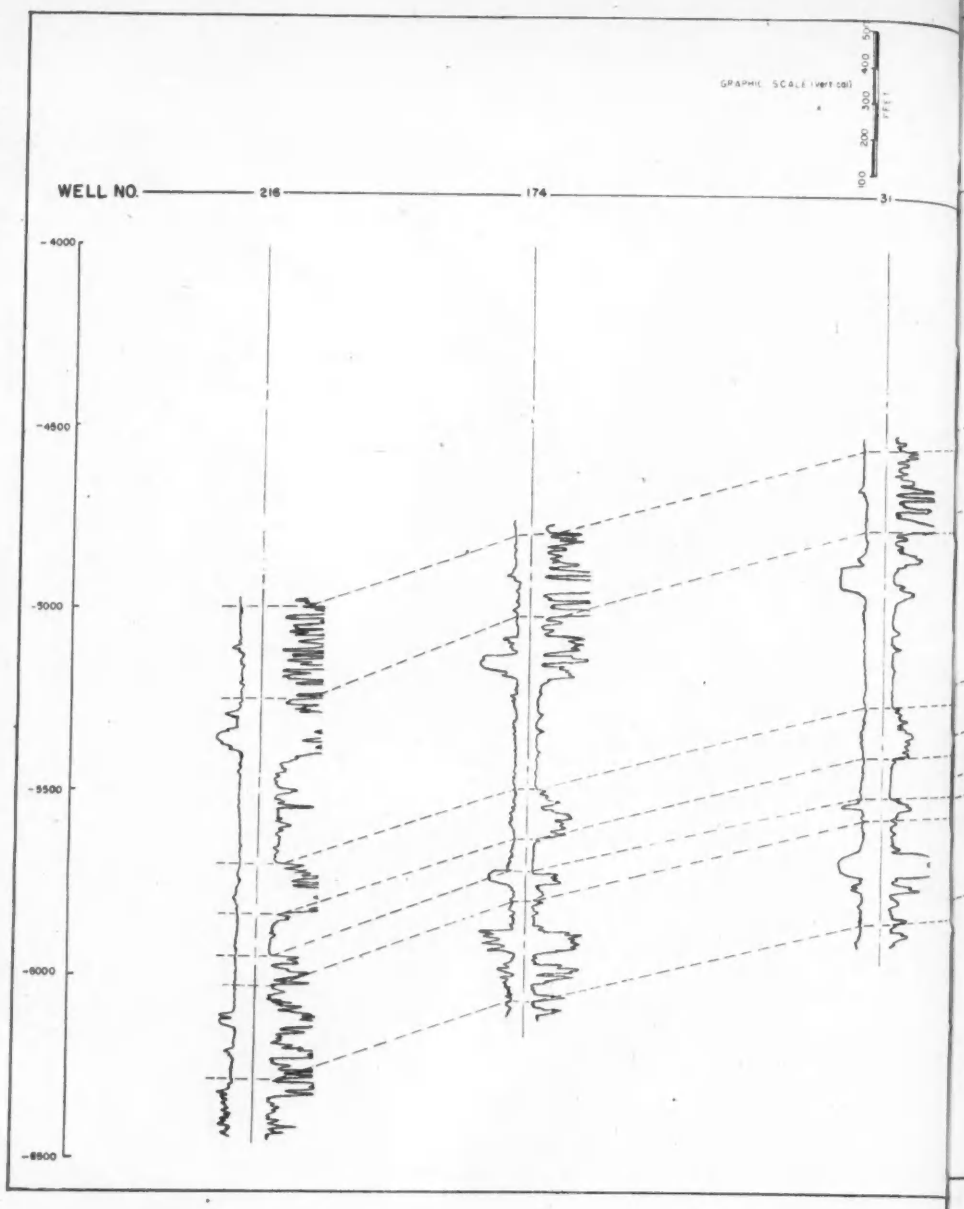
Pettit: Included in the Pettit section, as far as this paper is concerned, is the entire lime and shale section below the Pine Island shale and above the Travis Peak formation. It has not been divided into separate members, though several are recognizable in the field. However, many of them do not seem to be continuous over its entirety. Over all, the Pettit section is made up of beds of limestone and shale. of which there are two main limestone bodies which are of major importance. The first (Upper Pettit) porous zone usually occurs in the top of the Pettit section and is considered as the Upper Pettit porosity. This porosity does not always occur at the same point but is invariably found within certain limits. Plate 2 shows the porosity thickness of this zone over the field. It has been noted that where the porosity zone thins that the limestone also thins and in many cases is almost entirely replaced by shale.

Below the first zone of porosity, approximately 140 feet, usually occurs another zone of porosity, varying in thickness from location to location but extending almost over the entire field. This is considered the Lower Pettit. However, below this zone are found several other zones of porosity whose lateral extent vary excessively and are found only in local and isolated areas. In computing the porosity thickness for the Lower Pettit these lower zones have been included in the wells where they occur. Likewise in completing the wells having lower zones in addition to the regular Lower Pettit, these zones have been perforated and are produced along with the regular Lower Pettit zone.

It has been observed, after having cored both the Upper and Lower Pettit porosities in many wells, that as soon as the limestone begins to harden it begins to have thin streaks of shale and becomes much less oolitic. Gas bubbles often are noted coming from fractures in these harder portions.

Travis Peak: The Travis Peak formation is made up almost entirely of alternating beds of sandstones, shales, siltstones and calcerous sandstones. In the Carthage gas field several wells have penetrated as much as 500 feet, many of them finding porous sands which carry gas and condensate. Five wells in the area have penetrated the entire thickness of Travis Peak, finding an average thickness of 2100 feet.

Cotton Valley and Smackover: The Cotton Valley formation of Jurassic age has been partially penetrated in four wells of the Carthage field and completely penetrated in one well. The Texas Company T. C. Adams 1, which penetrated the total thickness, showed an overall total of 2550 feet. The formation consists of shales, sandstones and limestones. Some excellent porosities were shown but no commercial production was obtained. This same well found 700 feet of Smackover limestone overlying a bed of salt.



Sub-surface Structure

The sub-surface structure of the Carthage gas field may be described as an elongated dome with a dome-shaped closure superimposed upon it in the vicinity of Bethany. This higher closure, with a sub-sea elevation of a minus 5000 as compared with a minus 5300 for the Carthage High, is referred to as the Bethany High. These two closures are separated by a slight saddle and to all intents and purposes are a part of the same structural feature. The southeast side of the Carthage High saddles off into the Logansport anticline.

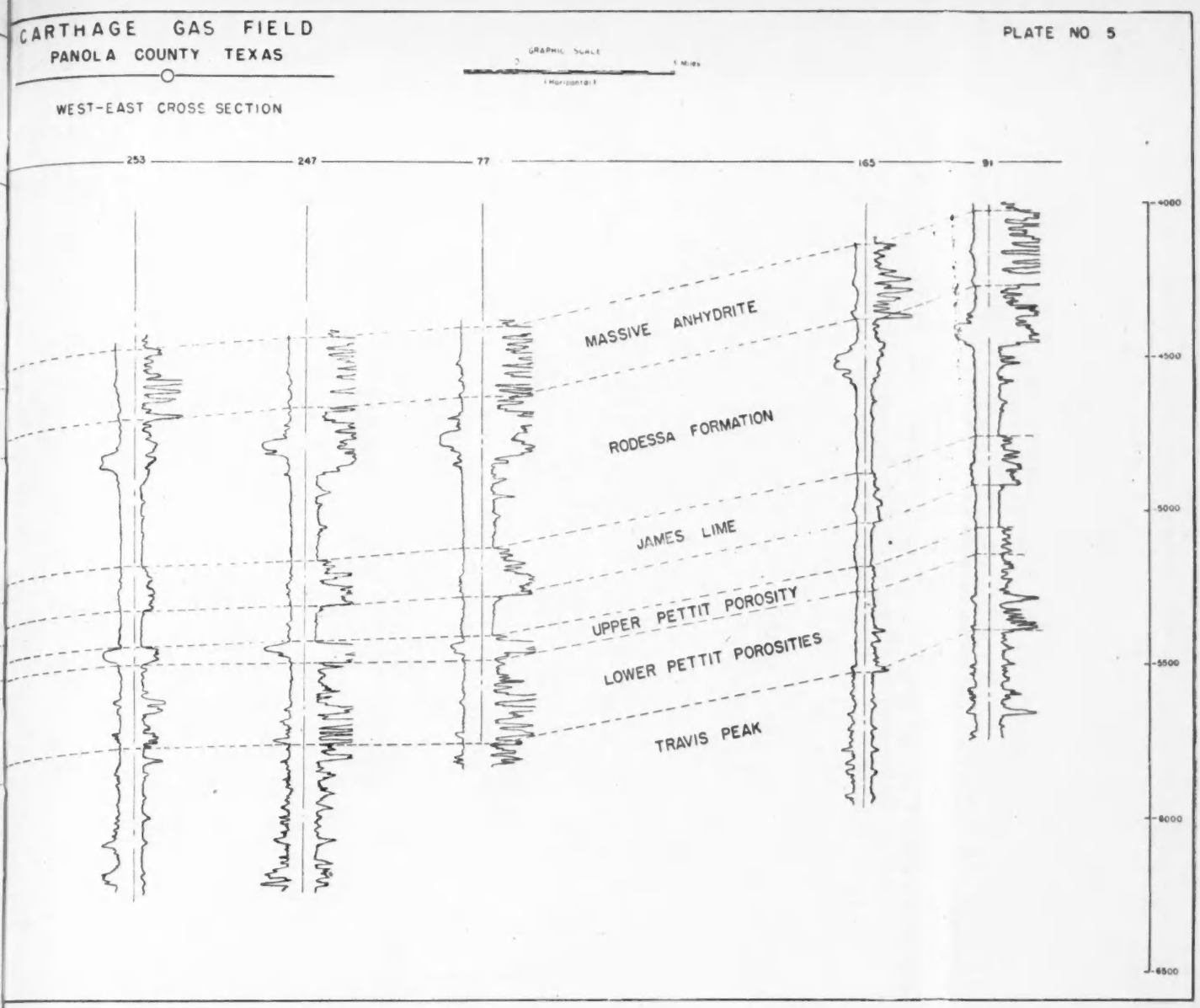
The structure map (Plate 1) shows the structure as determined on the base of the James lime. This marker has been chosen due to the ease with which it can be recognized on electrical logs, and also to its regularity over the entire area. A structure map on any marker below the massive anhydrite will show almost an identical picture. The Carthage and Bethany Highs are a part of the major feature of this area known as the Sabine Uplift, which also includes Waskom and Pine Island.

Reservoirs

Production in the Carthage gas field is confined to the Hill, Upper and Lower Pettit, and Travis Peak formations at depths ranging from 4800 to 6440; the bulk of it, however, is coming from the Upper and Lower Pettit. Plate 5 shows the stratigraphic position of the producing zones.

The productive Hill zone, a short distance below the massive anhydrite, has an areal extent of 25 locations or approximately 16,000 acres. Its productivity far exceeds any of the other producing zones of equal thickness due to its regular porosity and permeability. The following core laboratory test illustrates an average well in this zone:

	Permeability	
Porosity	Vertical	Horizontal



Depth. Percent. Millidarcys. Millidarcys.
4906-13 24.1 188 73.7

Many wells in this zone have made as much as 25 barrels of condensate per million cubic feet of gas. The average rock pressure for this zone is 2200 pounds.

The Upper Pettit zone of porosity extends over most of the field except for an area extending southeast from the town of Carthage, in which area the limestone is present but it has no porosity. In the porous area the limestone is highly oolitic with alternating layers of hard and soft oolitic material. When cored, the recovered material consists of thin hard layers, ½ to ¾ inches in thickness, separated by much softer material which is often entirely washed away. In making porosity and permeability tests, only the harder portions are available, consequently the results from these tests reflect a lower figure of percent of porosity than is actually the case for the overall thickness. After a study of many cores from this zone the conclusion reached is that only horizontal permeability is present. The following core laboratory tests are typical of many wells in the Carthage field for the Upper Pettit:

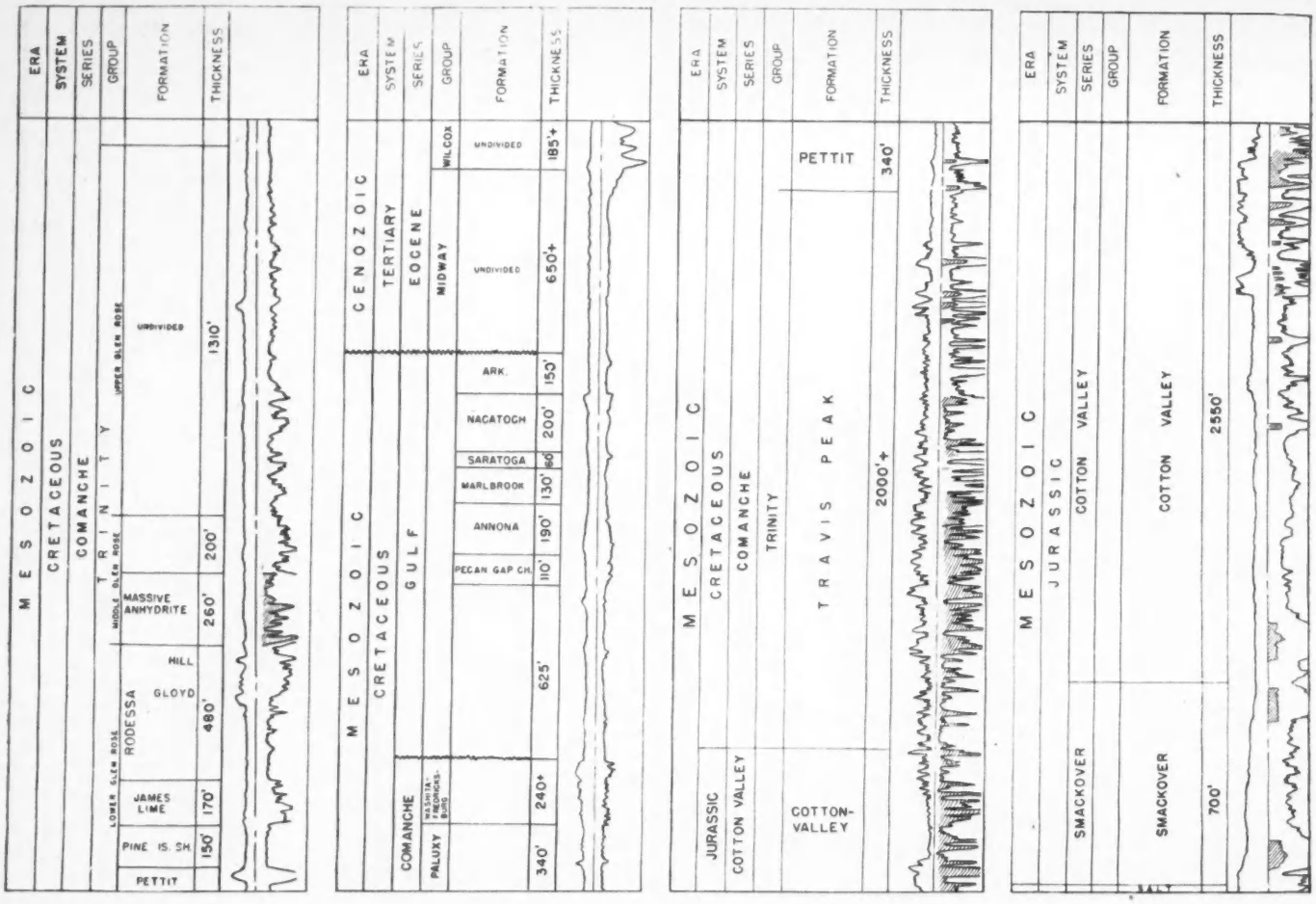
Depth.	Permeability Millidarcys.	Upper Pettit Porosity Percent.
5880-83	232	14.0
5888-90	20	7.1
5891-93	0.0	16.3
5893-96	0.0	18.2
5896-97	0.0	15.9
5897-98	0.0	16.5
5898-99	7.8	20.0
5899-5900	0.0	14.7
5900-01	10	5.0
5901-02	41	15.6
5902-03	0.0	20.6
5903-04	43	16.3
5904-05	90	21.7
5905-06	0.0	23.4
5906-08	0.0	18.0
5908-10	0.0	3.3
5909-11	103	11.4
5911-12	0.0	15.5
5912-13	0.0	16.3
5913-14	0.0	14.2
5891-92	0.0	5.8
5892-93	0.0	11.00
5893-94	21	13.0
5894-95	0.0	11.2
5895-96	0.0	3.2
5896-98	0.0	4.2
5899-5900	90	19.7
5900-01	75	20.6
5901-02	435	20.7
5902-03	175	20.5
5903-04	156	19.4
5904-09	74	17.5
5909-10	0.0	8.0
5910-11	0.0	7.6
5911-12	0.0	9.4
5912-13	0.0	9.6
5913-14	117	9.4
5914-16	0.0	7.6
5916-19	0.0	13.9

Condensate Production

The average condensate production from this zone is 16 barrels per million cubic feet of gas. The average rock pressure for this zone is 2575 pounds.

In this report the several zones of porosity in the lower 300 of the Pettit section are treated as the Lower Pettit. Except for the main zone of porosity, the others come and go with no particular regularity. On Plate 3 these zones have been included in the total thickness in each well. This has been done, since in completing the wells in the field, all these porous streaks are produced together, or as one zone. This is true with one exception, A. D. Roberts 1 Roberts, which was completed dually in one of these lower zones and the regular Lower Pettit porosity and was not perforated in the Upper Pettit.

For the most part the Lower Pettit



reservoir consists of an homogenous mass of oolitic lime with occasional streaks of harder material. The variable thicknesses from well to well are due to depositional changes. The main Lower Pettit zone oftentimes carries streaks of hard, black, carbonaceous material (possibly gilsonite), which shows evidence of having arrived in its position in liquid form and later solidifying. It often fills cracks and crevices of as much as an inch in width. On other occasions cracks and crevices were completely filled with crystalline anhydrite, showing positive evidence of fracturing. Many minute to larger fractures were noted, some completely filled, others partially, and others with no secondary material at all. The average rock pressure for this zone is 2725 pounds. The following core laboratory tests show the general porosity and permeability of the Lower Pettit:

Depth.	Permeability Millidarcys.	Lower Pettit Porosity Percent.
5985-88	3.1	6.4
5988-92	50	14.8
5992-94	10	7.6
5994-97	54	17.6
5997-00	121	24.2
6000-02	8.4	14.2
6002-07	0.0	1.8
6007-08	125	20.2
6008-09	146	20.4
6009-10	13	14.0
6010-11	107	18.5
6011-12	23	18.9
6012-16	0.0	3.5

Stratigraphic section of Carthage gas field, Panola County, Texas

Depth.	Permeability Millidarcys.	Lower Pettit Porosity Percent.
6254-55	0.0	7.9
6255-56	0.0	16.0
6256-57	76	23.8
6257-58	49	30.4
6258-59	0.0	22.8
6259-62	0.0	23.3
6262-64	18	20.9
6264-65	40	15.0
6265-66	28	12.3
6266-67	0.0	9.5
6267-68	26	10.5
6268-69	59	19.0
6269-70	58	19.2
6270	0.0	16.0
6271-72	10	14.6
6272-73	28	17.3
6273-74	18	16.6
6274-75	7.9	19.2
6275-76	24	21.3
6276-77	19	21.1
6277-78	21	17.4
6310-11	0.0	7.7
6311-12	0.0	11.1
6312-13	17	15.7
6313-14	8.2	14.9
6314-15	28	13.0
6315-16	0.0	12.1
6316-22	0.0	2.6

The reservoir rocks in the Travis Peak formation consist entirely of sands often quite silty, which have no continuity laterally. For some wells as many as eight separate sands have been found to carry gas and condensate. The average rock pressure for this zone is 2530 pounds. The following core laboratory test shows the results obtained from two zones in this formation:

Depth.	Porosity Percent	Permeability Millidarcys.
6126	13	0
6128	12.7	2
6130	15.8	9.6
6132	16.8	26.7
6135	14.9	0
6207	10.2	0
6313	11.3	1.9
6317	9.9	0
6322	12.3	1.5

Conclusions

The Carthage gas field has a productive area of approximately 300,000 acres and is not yet completely defined on the east side of the field. It is a domal type structure with no perceptible faulting but with considerable fracturing. Gas condensate production is proved for four main zones, the Hill, two main zones in the Pettit, and several sand zones in the Travis Peak. Acidization has been necessary in all zones except the Travis Peak. With the low permeability as shown on the core laboratory tests, it is unlikely that one well to each 640 acres will completely drain the field.

The field is of note as being the largest gas condensate reserve in the U. S. and with its present withdrawals it should have an exceedingly long life.

The possibilities for oil production are not considered to be bright in spite of the fact that a few wells have produced some oil, notably the Skelly Oil Company Matthews 1. Several wells on the west side have found water directly below the gas with no oil column present. The possibilities for production from those formations below the Travis Peak are limited and the information at hand offers little encouragement for either gas or oil from these beds.

Merry Christmas

May the holiday season bring you the peace of mind that is symbolized by the gleam of a burning candle. May you and yours enjoy, throughout 1947, the glow of radiant health. May the coming year be all that you want it to be. This is the sincere Christmas wish of the makers of

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Power Distribution Systems

FOR OIL FIELD PUMPING

By W. C. BLOOMQUIST
Application Engineer, Industrial Power Division, General Electric Company, Schenectady, New York, and

J. N. POORE
Petroleum Application Engineer, Dallas, Office, General Electric Company

THE purpose of this series of three articles is to review carefully the pertinent factors associated with power-distribution systems for oil field electrification and to submit engineering and cost data which are readily usable. By the use of these data, the best overall system for a particular lease can be quickly determined. The power system thus planned will have the proper relationship between engineering requirements and economics.

The electrification of oil fields for well-pumping service is increasing. In 1938 about 12½ percent of all pumping wells were electrified; by the end of 1944 about 20 percent of the wells were electrified.

Approximately two-thirds of the cost of electrification is for the power-distribution system, the remainder for the motors and control. Since the cost of motors and control is a constant factor for a given motor rating, any reduction is the cost of electrification must be made in the power-distribution system.

Voltage drop in the secondary lines is the determining factor in the distribution layout. Various methods of reducing the voltage drop are discussed.

Charts for quickly estimating the voltage drop for the most common system voltages are included. The "unit load—unit length" principle is introduced to aid in quickly estimating voltage drops where a large number of calculations are involved.

Capacitors for power-factor improvement offer so many advantages—both from economic and operating standpoints—that they should be considered for every oil-field electrification project irrespective of whether a power factor clause is involved in the power rate.

There are very little published engineering data or simple methods for determining the most economical distribution system, and it is hoped that the information presented here will fulfill that need. Typical examples are included for the use of the data.

Factors Influencing the Distribution System

There are a number of factors which affect the layout and selection of the type of distribution system, such as

1. Permissible voltage drop.
2. Cost of system.
3. Number and size of motors.
4. Well spacing.
5. Configuration of field.
6. Pole spacing.
7. Size and type of line wire.
8. Power-rate clause.
9. Service reliability.

The voltage drop is the main consideration in laying out a distribution system for an oil field because the power is supplied at low voltage (usually 440 volts) over long feeder circuits and the operating power factor is low.

Distribution-system voltages are usually designated in terms of the transformer or sending-end voltage, but because of the practice among oil field personnel of using the utilization voltage for the system voltage rating, that same practice generally will be used here to avoid confusion.

Good engineering requires that the minimum operating voltage should not be less than 95 percent or the maximum more than 110 percent of the motor nameplate voltage. Although motors will operate at less than 95 percent of the nameplate voltage, and manufacturers guarantee operation at 90 percent of that voltage, a minimum operating voltage of 95 percent allows some margin for the voltage drop occasioned by starting a motor. The voltage at the motor during starting should not be less than 80 and preferably 85 percent of the motor nameplate voltage.

In a well-planned system the voltage drops are distributed approximately as follows:

Primary line .....1-3 percent
Transformer .....2-4 percent
Secondary line .....7.5-12.5 percent

The total should not be more than 15 percent at the remote-well location.

If capacitors are used for power-factor improvement, the overall voltage drop will then be less and in the order of 10 to 12.5 percent.

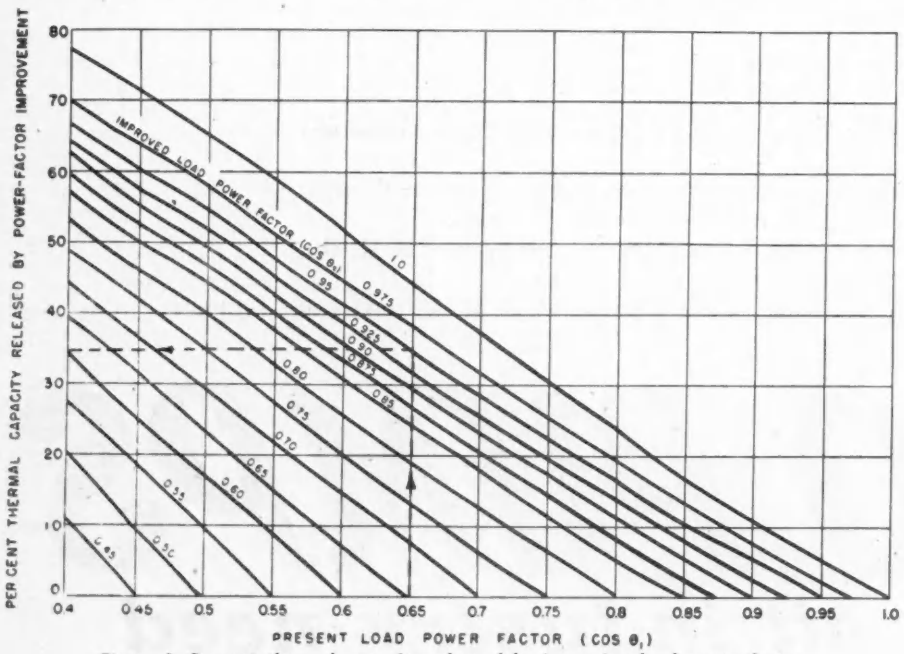

Figure 1. Percent thermal capacity released by improving load power factor.

Use Load Center Principle of Power Distribution

Since the major part of the voltage drop is in the 440-volt lines, these secondary runs should be kept as short as possible, within the realm of sensible economics. The load center principle of distribution is well suited to this type of distribution system. A fundamental principle of a load center system is that power at primary voltage is brought directly to the load area where it is stepped down to utilization voltage and then distributed to the individual load areas over short secondary feeders. The importance of the load center principle can be illustrated by a simple example. The following tabulation shows the percent voltage drop for 1000 feet of No. 1/0 aluminum ACSR wire. These values are based on the wire spacings commonly used for the respective voltages and on a load of 100 kw. at 70 percent power factor.

SERVICE

Part 1

Nominal System Voltage	Utilization Voltage	Percent Voltage Drop
480	440	15
2,400	2,300	0.57
4,160	4,000	0.19
13,200	13,200	0.019

Thus it is apparent that the use of 440-volt distribution should be limited to very short distances.

Selection of Primary Voltage

If utility power is used, the primary voltage is usually fixed by the utility practice and may vary from 2400 to 13,200 volts. If the primary voltage can be selected, 4160 volts are a good choice and allows for ample future expansion.

The difference in cost between a 2400- and 4160-volt system is so small that, for practical purposes, the total cost may be considered the same. However, the reduction in voltage drop is substantially in favor of the 4160-volt system.

System voltages above 4160 volts are seldom necessary in the average-sized lease, nor are they justified economically.

Reduction of line drop by increased conductor size is expensive. Consider the use of capacitors.

In a 440-volt system it is expensive to reduce the voltage drop by increasing the conductor size.

For example, the voltage drop in a 1320-foot line (40-acre spacing) of No. 2 ACSR with a 15-horsepower motor operating at 60 percent power factor is approximately 2 percent. If the conductor size is changed to 2/0, the voltage drop is 1.4 percent. If the motor power factor is improved by capacitors to 97.5 percent, the voltage drop with a No. 2 conductor is also 1.4 percent, or equivalent to the larger number 2/0 wire without benefit of power-factor improvements. The line costs, including stringing and sagging, are:

No. 2/0 ACSR....$288 for 1320 feet
No. 2 ACSR.... 184 for 1320 feet

Five kvar of capacitors are recommended for a 15-horsepower high-starting-torque, 1200-revolutions per minute motor. The installed cost of capacitors is $12.50 per kilovar or $62.50. The net saving, in this case, with the capacitor method is $42.50.

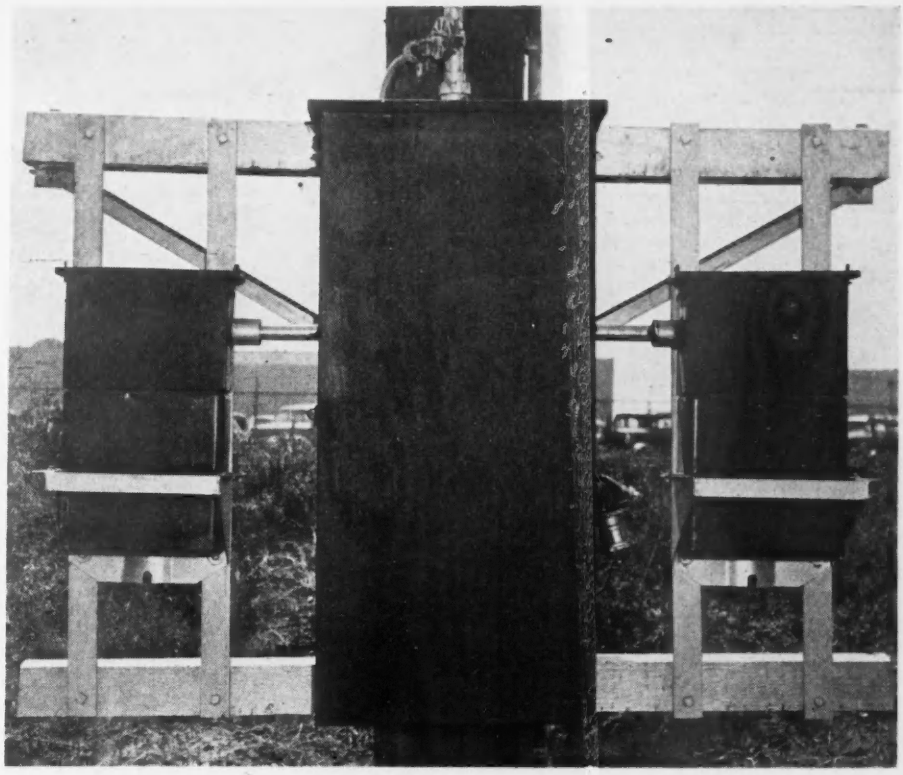

Figure 3. Two capacitors on motor well pole and connected to load side of motor starter. This is equivalent to connection in Figure 2-A, where motor and capacitor are switched as a unit.

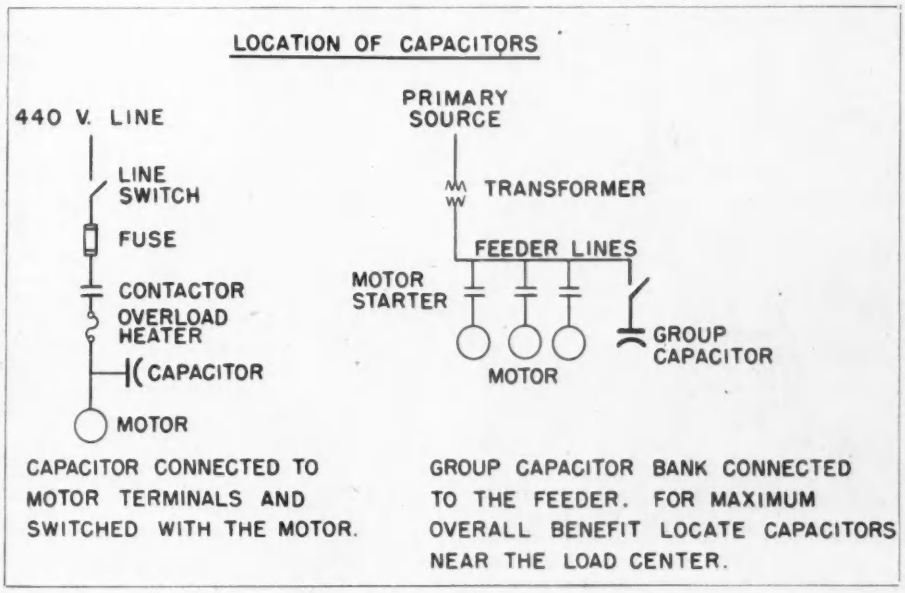

Figure 2. Location of capacitors on 440-volt circuits.

Use transformer taps to compensate for voltage drop in primary line and transformer.

Since the total load of an oil field is rather steady, consideration should be given to compensation of the voltage drop in the primary line and transformer by adjustment of transformer taps.

Most transformers are available with two 2½-percent taps (above and below normal voltage) at very little increase in cost, and in some ratings these taps are available at no increase in price. If it is possible to utilize the full 5 percent tap range in either direction, this will result in a large saving in conductor costs of secondary lines or permit more wells to be served from a substation location.

Use voltage regulator if incoming supply varies.

If the incoming supply voltage varies more than a few percent and the secondary-voltage levels are approaching the minimum operating voltage, a voltage regulator in the incoming service connection should be considered. A regulator assures constant voltage on the primary and, if desirable, the line-drop compensation feature can be incorporated to compensate for line and transformer drop.

Consider individual transformer banks for large motors and well spacing.

When the motor load and well spacing are large the economics may favor the use of individual stepdown transformers at the motor locations.

Transformer and System Protection

Single-phase transformer units preferable.

Transformer banks may be made up

of single-phase units or three-phase units. Generally, single-phase units are preferable in these small pole-type transformers because:

1. They are standardized for the industry and quickly obtainable.
2. They have small unit weight and therefore are easily handled.
3. Less spare stocks are required.
4. Power can still be supplied, but at reduced capacity, in event of outage of one transformer of a delta-delta-connected bank.

Delta-Delta transformer-winding connections recommended.

There are several transformer-winding connections that can be used; for example, primary wye and secondary delta, or delta-delta, and delta-wye. The delta-delta connection is recommended because:

1. Transformer banks can be operated open-delta in the event one transformer is out of service.
2. Standard two-coil overload protection can be used in motor starters.
3. Motor burnouts are avoided due to single-phase operation, such as can occur in case a primary fuse or line is open when transformer connections are wye-delta or delta-wye and the motor is protected by two-coil overload relays.

There is some misunderstanding regarding transformer primary connections on grounded or ungrounded, three-wire, wye systems, such as a 4160-volt system which is the wye of 2400 volts. Primary transformer connections are independent of the system connection or method of system grounding. Therefore, primary transformer connections can be delta regardless of whether the power system is wye or delta or grounded or ungrounded.

System Protection

When the transformer bank is connected to overhead exposed lines, lightning arresters should be included at each substation for maximum protection. The number of supplementary arresters, especially on the 440-volt lines, is dependent upon the frequency of the lightning in the particular area.

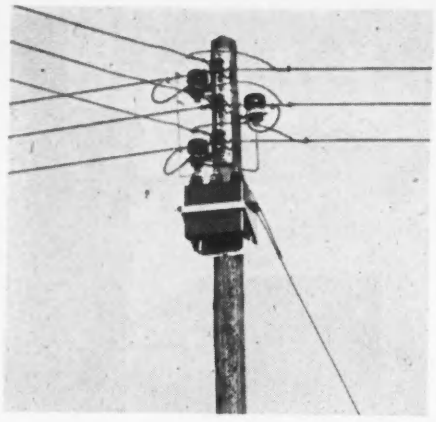

Figure 4. Capacitor on main 440-volt feeder circuit. This is equivalent to connection in Figure 2-B.

A check should be made with the local utility to determine whether the system is sufficiently grounded to permit the use of the line-to-ground voltage class of arresters, which offer better protection to equipment and cost less than arresters for ungrounded service.

The 440-volt systems are invariably delta and ungrounded so arresters for ungrounded service should be selected.

Some means should be incorporated at each substation to automatically remove a transformer-bank from service under system faults or heavy sustained overloads. Fused cutouts are economical and are almost universally used for the transformer-bank sizes normally used in this class of service.

Ground connections to the motor-starter case, lightning arresters, and the pumping-unit frame should be well bonded to the common ground source, usually the well casing.

Capacitor Applications

The power-factor of oil well pumping loads is very low, because, first, the average load is only about 60 to 70 percent of the motor horsepower rating, and, second, many motors are underloaded, i.e., below the average of 60 to 70 percent.

Studies of several oil field leases showed that layouts with capacitors resulted in the most economical arrangement on a first-cost basis. In addition, there is the saving in power costs due to the reduction in system losses, and there also may be a saving if a power-factor clause is included in the rate structure.

Where the usual power-factor clause is involved for billing purposes, capacitors generally pay for themselves in one or two years or a rate of return on their investment of 50 to 100 percent.

The saving in system losses—ordinarily not even considered in oil field layouts—is tremendous, because of the continuous day in and day out load. System power losses are proportional to the square of the current (I^2), and since current is reduced in direct proportion to improvement in power factor the losses are also proportional to the square of the power factor, or $(PF)^2$. For example, if the power factor is improved from 65 to 95 percent, the losses at the improved power factor are only $(65/95)^2$ or 47 percent of the losses at 65 percent power factor. In oil field distribution systems, with the relatively long secondary runs, it is not at all unusual for capacitors to pay for themselves due to reduction in system losses alone.

Since the line current is less with an improved power factor, the voltage drop is less (which means more wells can be served or the wire size reduced); also the required substation capacity is less, resulting in a lower investment. It is because of the increased distribution, substation, and generating facilities required on the part of the utility to serve a low-power-factor load that a power-factor clause may be made part of the rate structure. Similarly, more investment is required if local generation is employed.

Therefore, with the possibility of savings in power costs due to a power-factor clause, reduction in system investment, and savings in system losses, every oil field electrification plan should be investigated to determine the advisability of using capacitors.

Figure 1 shows the percent system capacity released by power-factor improvement. It should be noted that the gain in system capacity is especially attractive when the operating power factor is low, such as is true of oil well pumping service.

Some of the advantages of power factor improvement may be summarized as follows:

1. Improved voltage level.
2. Reduction in substation rating.
3. Reduction in conductor size or an increase in the number of wells that can be served for a given voltage drop.
4. Reduced kva demand and a reduction in power costs if a power-factor clause is involved in the rate structure.
5. Lower investment cost for local generating facilities.
6. Release of substation capacity in existing systems.
7. Higher motor starting torque because of improved voltage level.

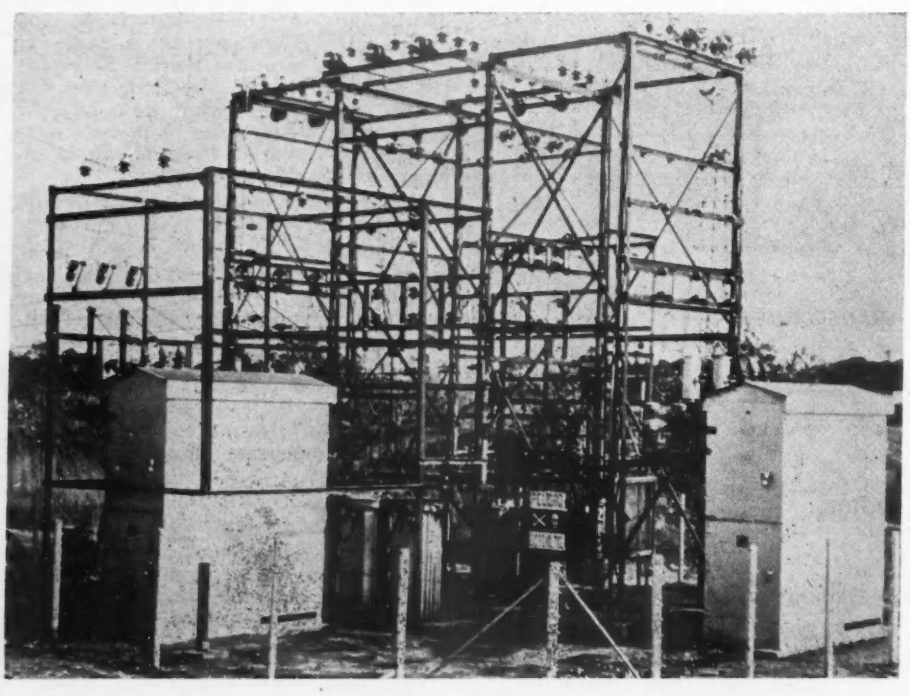

Figure 5. Two 180-kvar, 13,200-volt, metal enclosed capacitor equipment connected to a main high voltage distribution system.

A Merry Christmas and A Happy New Year

AGAIN the candle glow of Christmas shines round the world. Once more men kneel to thank the Lord of Peace on Earth and pray that war and bloodshed be no more; rise to build a stronger future and better tomorrow.

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Carl J. Hochenauer, President

GENERAL OFFICES TULSA, OKLAHOMA

Location of Capacitors

Capacitors may be connected to the motor or on a feeder as shown in Figure 2. When capacitors are connected to the motor terminals, the motor and capacitor are switched as a unit by the common motor starter. In this case the capacitors are usually located at the motor on the pumping unit or on the motor well pole with the motor starter, and the capacitors connected to the load side of the starter.

For maximum over-all benefits, the capacitors should be located at the load, i.e., at or near individual motors.

The advantages and disadvantages of having capacitors connected to individual motors versus group capacitors connected to feeders are as follows:

Capacitors connected to individual motors (Figures 2a and 3).

1. Power-factor improvement is made at the load resulting in maximum over-all benefits.
2. The capacitor can be switched with the motor, thus providing power-factor improvement automatically and when needed.
3. Simplicity of operation.
4. Improved voltage level on each motor feeder.
5. Aids in sloping off incoming waves due to lightning or switching surges and, therefore, helps protect the motor windings.
6. If there is motor diversity the initial cost will be greater than the group method.

Capacitors connected to main 440-volt feeders (Figures 2b and 4).

1. Advantage can be taken of diversity when all wells are not pumped simultaneously, thus reducing the total capacitor kilovar requirement and the investment.
2. Lower cost per capacitor kvar inherent in larger size capacitor blocks.
3. Reduction in power loss is only from point of capacitor location back to the power source and, therefore, there is no reduction from capacitors to motors.
4. May require automatic switching equipment if the load varies considerably, or there are frequent line outages where local generation is used.

The choice between these two methods depends mainly upon the ratio of the number of wells in operation to the total number of wells. If all wells are pumped simultaneously, capacitors at individual motors are preferable for over-all operation. However, if only part of the motors are in operation, the group capacitor method will have a lower investment cost. For example, if only half of the wells are pumped simultaneously, the group capacitor kvar need be only half that required with a capacitor at each motor. Furthermore, capacitors in small units for motors cost more per kvar than the larger units for group capacitors, thus further favoring the group capacitor method. However, if losses are evaluated, then even though the first cost of capacitors for individual motors will be more, the total annual operating cost may be less. Each case should be evaluated.

TABLE 1

Recommended Maximum Capacitor Rating When Capacitor and Motor Are Switched as a Unit[1]

Representative data for three-phase, 60-cycle splashproof 50 C 440-volt induction motors for oil-well pumping-service[2]

Normal starting torque motor

Motor Horsepower Rating	MOTOR SPEED IN R.P.M.					
	1800		1200		900	
	KVAR[3]	%AR[4]	KVAR	%AR	KVAR	%AR
5	2	14	2	16	3	25
7.5	3	13	3	15	4	22
10	4	11	4	12	5	17
15	5	11	5	11	7.5	16
20	5	10	5	11	7.5	15
25	7.5	10	7.5	10	10	14
30	10	9	10	10	10	13
40	10	9	10	10	12.5	12
50	12.5	9	12.5	9	15	12
60	15	8	15	9	17.5	11
75	17.5	8	17.5	8	20	11

High starting torque motor

Motor Horsepower Rating	MOTOR SPEED IN R.P.M.					
	1800		1200		900	
	KVAR[3]	%AR[4]	KVAR	%AR	KVAR	%AR
5	2.5	16	3	22	4	30
7.5	3	14	4	19	5	27
10	4	13	5	17	7.5	25
15	5	12	5	15	10	22
20	5	12	7.5	14	10	19
25	7.5	12	10	13	12.5	18
30	10	12	10	13	15	17
40	12.5	11	15	12	20	17
50	15	11	17.5	12	22.5	16
60	17.5	11	20	11	25	16
75	20	11	25	11	30	15

NOTES: [1] The motor power factor, with capacitor ratings listed in this table, will range from 95 to 98 percent at full load and 95 to 100 percent at partial loads ranging from 50 to 75 percent.
[3] Kvar is the rating of capacitors in kilovolt-amperes connected at motor terminals.
[4] Percent AR is the percent reduction in line current due to capacitors and is helpful in selecting the proper motor-overload setting when the overload relay is located as shown in Fig. 2(a).

TABLE 2

Power-Factor Improvement Table

(Figures below x kw input = kvar of capacitance required to improve from one power factor to another.)

Original Power Factor in Percent	DESIRED POWER FACTOR IN PERCENT								
	85	87	90	91	92	93	94	95	100
50	1.112	1.165	1.248	1.276	1.303	1.337	1.369	1.403	1.732
52	1.024	1.077	1.160	1.188	1.215	1.249	1.281	1.315	1.644
54	0.939	0.992	1.075	1.103	1.130	1.164	1.196	1.230	1.559
56	0.860	0.913	0.996	1.024	1.051	1.085	1.117	1.151	1.480
58	0.785	0.838	0.921	0.949	0.976	1.010	1.042	1.076	1.405
60	0.714	0.767	0.850	0.878	0.905	0.939	0.971	0.005	1.334
62	0.645	0.698	0.781	0.809	0.836	0.870	0.902	0.936	1.265
64	0.580	0.633	0.716	0.744	0.771	0.805	0.837	0.871	1.200
65	0.549	0.602	0.685	0.713	0.740	0.774	0.806	0.840	1.619
66	0.518	0.571	0.554	0.682	0.709	0.743	0.775	0.809	1.138
68	0.459	0.512	0.595	0.623	0.650	0.684	0.716	0.750	1.079
70	0.400	0.453	0.536	0.564	0.591	0.625	0.657	0.691	1.02
73	0.316	0.369	0.452	0.480	0.507	0.541	0.573	0.607	0.936
75	0.262	0.315	0.398	0.426	0.453	0.487	0.519	0.553	0.882

Example: What kilovars of capacitance (capacitor kvar) is required to improve the power factor from 65 to 95 percent for a 150 kilowatt load?
From the table the **kilowatt** multiplier is 0.84. The kvar required is 150 x 0.84 = 126. Use 120-kvar bank, the nearest standard.

Group Capacitors on Primary Lines

In some oil fields (such as certain South American fields) served by long primary feeders, it may be necessary to install additional capacitors on the primary line to obtain proper system operations. Such capacitor installations usually consist of totally metal-enclosed factory-assembled equipments such as is shown in Figure 5. The capacitors can be automatically controlled at very little extra cost.

Selection of Required Amount of Capacitors

Table 1 lists the recommended capacitor kvar value for use with motors. The resulting motor power factor in the operating range for oil field loads is 95 to 100 percent. When capacitors are connected to the motor terminals, motor underloading has very little effect on the operating power factor.

Since the motor current taken from the line is reduced when capacitors are connected to the motor terminals, allowance should be made for this to properly protect the motor against overloading. Table 1 gives the approximate percent ampere reduction (percent AR) due to capacitors and is useful in selecting the proper motor overload heater element.

Table 2 gives information for selection of the m-g capacitor rating for the group capacitor method of power-factor improvement.

[To be continued]

That Your Holiday Season be
One of Merriment, Joy and True
Fellowship is Our Heartfelt Wish.
A Very Merry Christmas to All!

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Treatment OF GUN-PERFORATED WELLS

By WARREN J. JACKSON
Lane-Wells Company

THE producing efficiency of gun-perforated wells depends on successful treatment or cleaning to stimulate or revive the production of gas and oil. This involves a studied analysis of the specific causes of impeded flow of the hydrocarbons into the well bore, and the application of methods that will accomplish the desired results with a minimum of cost and loss of oil production. Conditions attendant to the completion and maintenance of oil production on gun-perforated type wells do not offer any special problems over what is normally experienced in other methods of completions.

In the completion of oil and gas wells following gun perforations, the wells do not always respond in production when the conventional practice of circulation, pressure wash, or swabbing is used. This condition has dictated the development of remedial measures in order to properly treat these wells for the maintenance of production.

Early Practice

In the early development of gun-perforating practice, the perforating of casing was assumed to be more or less standard operation, and little thought was given to the results accomplished on the basis of well productivity.

The usual procedure of setting and cementing the casing through known sands was followed, either because of the anticipated deeper production, or with the idea of testing one or more zones selectively for the exclusion of excess gas and water. The casing opposite the known productive intervals would be gun perforated with a shot pattern selected at random, which consisted of 1, 2 or 3 holes per foot with little consideration as to size of the bullet, and the well placed on production.

If the well produced oil at a rate which was satisfactory to the well owner, that was it, and nothing more was done. However, in instances where the production was below normal, it was assumed that the trouble was due to gun perforating. No attempt was made to analyze the situation to discover whether a sufficient number of holes had been perforated per foot, whether the holes were of correct diameter, or whether the drilling muds used in drilling the well and the character of the formations opposite the perforated section were of such composition and nature as to clog these perforations in the casing, partially or completely, thereby restricting the flow from the reservoir into the well.

The progress made in production practices has been accomplished through research and a better understanding of the mechanical efficiency of production equipment. As a result, a comprehensive study has been carried on of the conditions adverse to the free passage of oil through the area adjacent to the perforated casing and through the openings themselves. This applies to new zones that have been cased off and which are to be tested for production, as well as to zones that have been producing but indicate the need for remedial work to stimulate or revive production.

Well Conditions Influencing Perforating Results

Reservoir studies have shown that the greater part of the energy consumed in moving oil from the reservoir into the wells is expended in forcing the oil through the sands immediately surrounding the well bore. In a great many fields the sediments and texture of the producing formation is loose and unconsolidated, and the oil flowing through the openings of the porous and permeable sections carries with it floating sand, silt and colloidal material toward the well. This material tends to accumulate in the sand pores, particularly opposite perforations that are partially clogged by mud or other material as a result of completion practices.

The restrictions to flow through the perforated section creates abnormally high pressure drops near the bore hole of the well, and only nominal productivity is obtained in many instances. Many oil sands contain clay or bentonitic material that has the ability to hydrate or swell when in contact with water; and this hydration of such materials in the sand will cause a reduction in its permeability. It is well known, of course, that rotary drilling muds contain large percentages of clays, some of which have high colloidal properties (such as the pure bentonites) and others that possess colloidal properties to a lesser degree.

There are several ways in which abnormally high pressure drops may be created near the bore hole or through the perforated area of a well. These are as follows:

1. Swelling of bentonitic material in sands through contact with water, and possibly the infiltration into the sand of very small mud particles from the drilling mud.
   Salt water as well as fresh water will cause bentonite to swell, although not nearly as much, and the degree of swelling is dependent upon the concentration of the salts in the water. Salt water will cause a reduction of permeability in some sands.
2. Infiltration of water from drilling muds during drilling operations.
   The amount of water entering the formation from a drilling mud depends upon the mud characteristics, the length of time that the mud is in contact with the sand, and the differential pressure exerted against the sand.
3. Preferential deposition of some of the heavier hydrocarbon constituents of crude oil near the bore due to reduction of the pressure in this area during flow into the wells.

Very little is known about the actual mechanism of the plugging of sand by the preferential deposition of some of the heavier hydro-

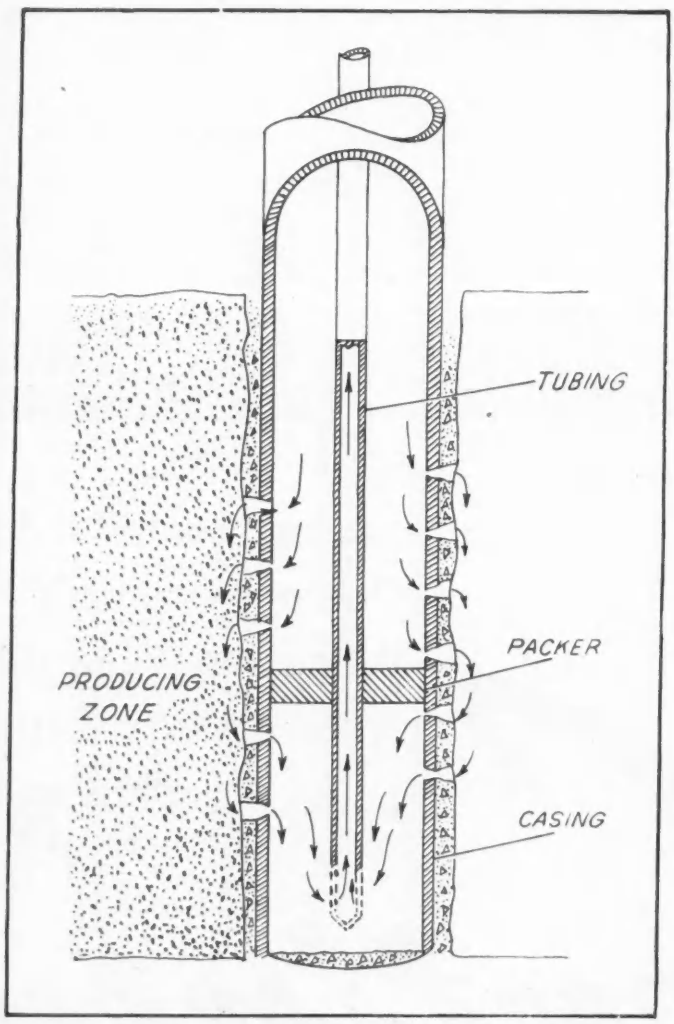


Figure 1

carbons of crude. However, investigations along this line are being carried on by several laboratories. The best indication of this deposition is the fact that treatments using a combination of kerosine and paraffin solvent has produced good increases in the production of many gun perforated wells.

4. Mud film on the wall of the hole.

In the placing of cement behind the casing, the scouring action of the slurry has been recognized, although the thicknes of the mud film left on the sand face is not knwon. The effect of the natural formation temperature and the heat of crystallization of the cement on this film and on the mud fluid in the pore space of the sand is to cause a further obstruction; moreover, it has been pointed out by investigators of the problems that "where wells have been drilled through oil producing formations of low differential pressure a sheath of mud cake has been formed between the casing and the surface of the formation, which after a time becomes as hard and impervious to the passage of oil as the cap rock that holds the oil and gas in place in the structure. Actually, the clay in the drilling fluid, which later becomes a mud cake behind the casing, was a pulverized part of that cap rock or some similar material."

Remedial measures taken to stimulate or maintain production in new as well as old producing wells will generally have to overcome even more adverse subsurface conditions. The natural zone characteristics as outlined above will have been reflected in the production history of the well. In the original completion of the well which has to do with the method employed in drilling into the productive zone, failure to alter the characteristics of the mud-laden fluids imposed against the zone with respect to its natural reservoir pressure will have an immediate effect upon the response from the reservoir on completion. This problem is of special concern where reservoir pressures are low because the use of mud-laden fluids which will cause excessive pressures to be imposed against the producing zone results in these fluids being displaced laterally into the zone, causing the flow of oil and gas from the reservoir to be impeded.

Ability of the formation to retain its original wall depends principally on shear and the pressure drop at the sand face. While the original hole diameter is often retained through the producing formation by the pressure and wall building properties of the drilling fluids, cavings from above or even in the producing sand itself occur when conditions change in testing and completing the well. Where the nature of the formations are such that the original hole diameter cannot be retained, restrictions to flow through the perforations are even more pronounced.

Penetration

Extensive laboratory and field tests in gun perforating practice have developed factors such as gun design, bullet design, and the type and amount of powder charge. In order to obtain the ing a well, there are certain well known facts about each individual well that should be taken into consideration in the design of the completion program. These are as follows:

1. Consideration should be given to the fact that a bullet fired from a perforating gun is expected to pierce the steel casing, hard cement, mud filter cake, and travel a sufficient distance into the formation to penetrate beyond the area of any section of the sand that is contaminated with mud, cement or water that has reduced its permeability. The power behind the bullet fired from the gun chamber must be capable, in the short interval of space between the gun and casing, of energizing the bullet from zero velocity to a velocity approaching 3000 feet per second from a barrel whose length is seldom over two inches, and usually not over 1¼ inches long.

Results of extensive laboratory tests have shown that even a small increase in barrel length will result in a substantial increase in penetration. This increase in penetration is more pronounced in some types of guns than in others, but in all the larger guns have shown better results.

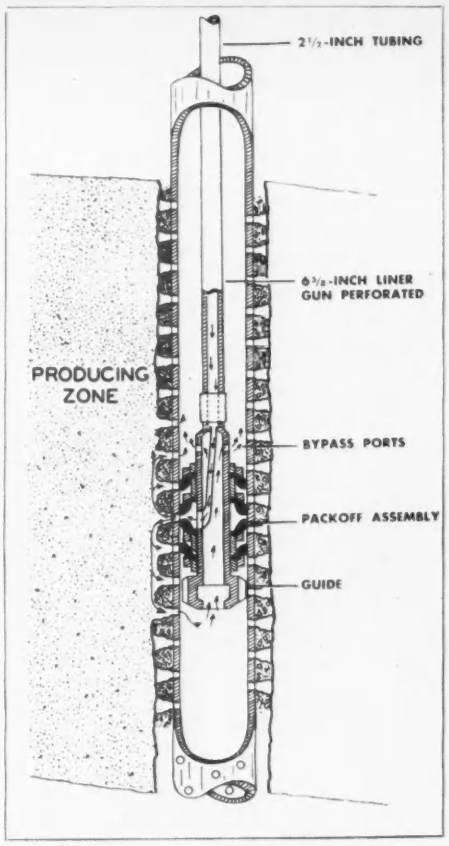


Figure 2. Cross-section of circulating tool.

powder necessary to ascertain efficiency for maximum penetration.

Uniform penetrative energy is assured by accurate measurement of powder, maintenance of barrel tolerances and precautions to prevent dampening of the most efficient results from gun perfora-

Two Casing Strings

Wells which are completed with casing sizes less than 5½ inches require the use of guns in critically small sizes ranging from 1¾ inches to 3 1/16 inches in diameter, to permit suitable operational clearance between casing and gun. There are instances in the completion of wells where two casing strings are used, when the inner of the two strings is either 4¾ inches or 5

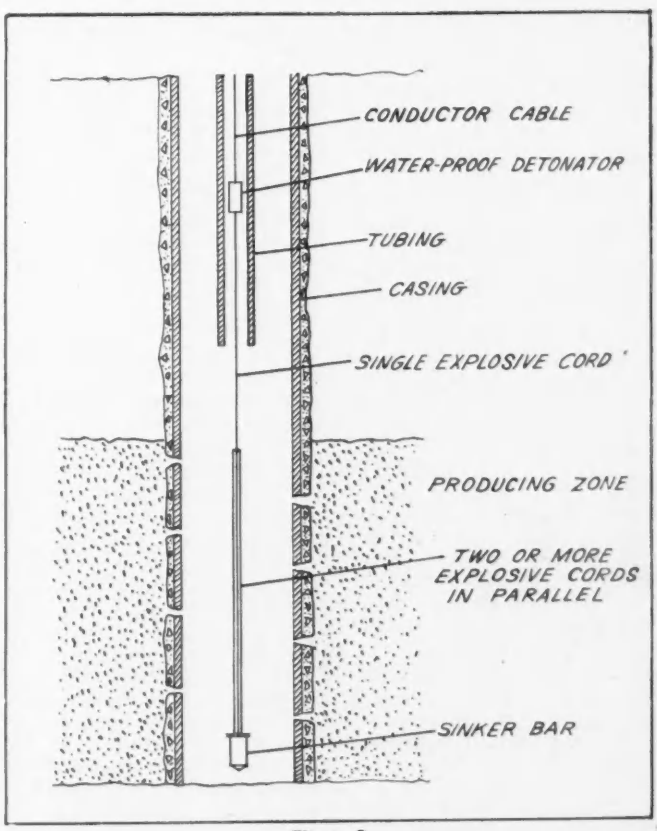


Figure 3

inches, and in some cases this is reduced to tubing or drill pipe as a liner inside a larger string of casing.

In the case of most wells, completions of the type outlined above are emergency in nature and result from operational problems encountered in drilling and completing the wells. It is necessary in completions of this nature to reduce the factor of safety in gun perforating to a minimum, and the problem resorts to a matter of skill and knowledge on the part of the gun-perforating service in obtaining a satisfactory completion. This is an important factor to consider when planning a completion program wherein the setting of liners or protective strings are involved.

2. In wells where a single string of casing has been used, it has occasionally been determined that a well failed to produce after having been gun perforated. When analyzing these conditions, interesting facts have been discovered, as follows:

Conditions Analyzed

a. The sand particles were harder than the steel from which the bullets are made.

b. Bullets which penetrate through casing will encounter sand particles in either the drilling mud, cement, and in the formation. A bullet which has encountered such particles will invariably show marks or striations on its nose.

c. The gauge of the well bore diameter will vary from the original bit size in a great many instances as a result of washing, or caving. The cement job which follows can and does quite frequently result in a barrier of cement which cannot be successfully penetrated by a minimum shot density.

d. To successfully complete any well where adverse conditions exist of the nature previously described, the shot density must be increased. The shots should be fired and distributed in such a way that each succeeding bullet will receive the penetrative benefits of the preceeding shots. It is only through completion practices of this kind that effective penetration will be accomplished in the face of difficult completion problems.

Through a close study of the surface tests and sub-surface data, it is possible to alter each detail of gun design to the end that a perforating gun is no longer a tool, but an instrument for the completion of oil and gas wells which is carefully balanced and maintained. It is only through strict adherence to field maintenance, study and inspection standards in the application and performance of gun perforating equipment that successful well completions are assured.

Well treatment methods are primarily of the mechanical, hydraulic, chemical and explosive type. The mechanical cleaners include perforation scrapers, washers and bailers for the removal of material from the bottom of the oil string. The hydraulic methods depend on pressure differential opposite the zone to be cleaned while the chemical methods involve the breaking down or dissolving of the material deposited in and immediately surrounding the perforations. In the use of explosives, cleaning action results from the pressure caused by the explosion transmitted laterally through the perforations.

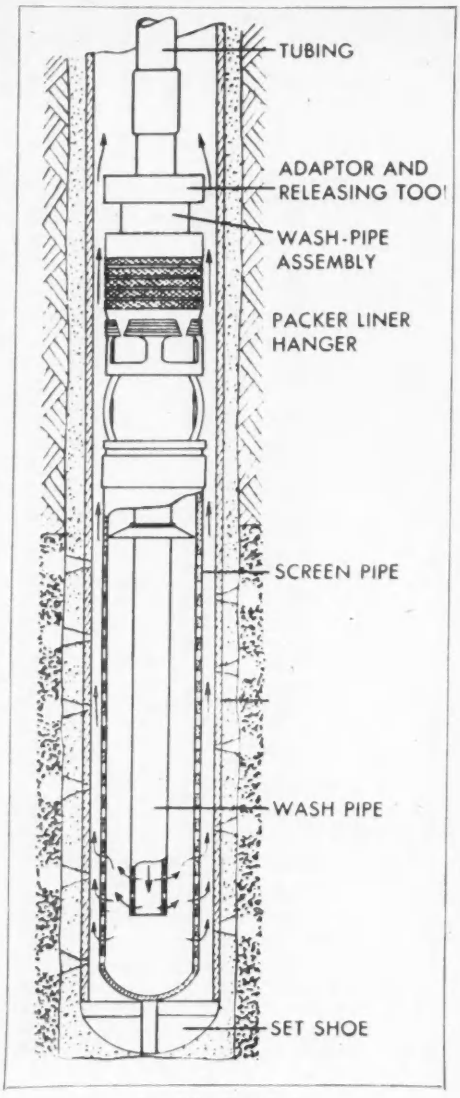


Figure 4

When customary completion practices are performed, including washing, swabbing, circulation with oil, pressure drilling and reverse circulation method, with no apparent results in formation response, it is evident that the harmful effect of mud fluid, water and the formation itself in sealing and restricting the free passage of oil through the sand pores, annular space, and the perforations themselves is of principal concern.

Whether or not these methods are adequate, the advisability of removing all the mud fluid and water cannot be questioned and the hydraulic cleaning methods have been the ones sometimes used for this purpose. These methods depend on differential pressure to utilize formation pressure or pump pressure to open the perforations. In the suction bailer and vacuum washer, a decreased pressure (in some instances approaching atmospheric pressure) is confined to a restricted area through the use of packers, as illustrated in Figure 1. This is accompanied by a surging action of the fluid resulting from the equalization of pressures in which the total pressure due to the hydrostatic head is exerted against the perforations just above the packer.

The pressure type washers increase the pressure opposite the perforations through the use of pumps. A recent development in a pressure type circulation tool is illustrated in Figure 2, which is essentially an opposed swab assembly or circulating mandrel, with the opposed swab cups placed as close to each other as possible, approximately eight inches apart. An equally effective washing element can be a two-packer hookup with perforated nipple between. Pump pressure is applied to the tubing to build up the required fluid pressure to break circulation between shot holes opposite the perforated section and pump the fluid volume desired for washing. This type of hydraulic pressure type washer has been used quite successfully in cleaning perforations and has resulted in increased production when using oil or water as the circulating fluid.

Wells are usually treated with low surface tension fluids such as inhibited hydrochloric acid or water prior to the application of hydraulic methods. These fluids are pumped into the formation for the purpose of dissolving any mud cake or any other acid soluble material that may have become lodged within the producing formation. This has proven a very effective means of assisting in the removal of this material by hydraulic methods.

Chemical Methods

The technique of treating wells producing from sand and limestone formations by chemical methods has made rapid strides in the last few years. An acid commonly called mud acid is used to clean the well bore of mud cake, bentonite, or other acid soluble formations which tend to clog the gun perforations in the process of completion. Mud acid is a specially prepared admixture of inhibited hydrochloric acid, sodium floride, and certain other reagents that greatly increase the solvent power of the acid to dissolve mud and clay-like materials.

The properties of mud acid are such that it will dissolve any of the materials that are soluble in hydrochloric acid such as limestone calcium, carbonate scale and cement. In addition, it has the property of partially dissolving clay materials such as those found in sand formations and drilling muds.

To secure the best results it is essential that an accurate diagnosis be made as to the nature of the material responsible for restricting flow through the perforations and formations in order that the proper chemical treatment can be applied in treating the well. In many instances successful jobs have been performed when, following the treatment of the well with acid or other chemicals, the proper hydraulic methods were applied.

It has been found by X-ray analysis that many sand formations, particularly those in the Texas and Louisiana Gulf Coast, contain appreciable quantities of those clay materials with the percentage of this material present in oil sands

SHINES ETERNALLY

Carrying the message of "Peace on Earth, Goodwill Toward Men," throughout the world. Christmas, 1946, should be a joyous Holiday period in which the Christmas Star shines brightly on a world at peace.

GRAY
TOOL COMPANY
HOUSTON

Export Representative: GUY E. DANIELS, 30 Rockefeller Plaza, New York, N. Y.
Rocky Mountain Representative: CARL MOULDEN, P. O. Box 1890, Casper, Wyo.
Mexico Representative: W. Y. DE MOUCHE, Paris 12, Mexico City, D. F.

TABLE 1

X-ray Analyses of Typical Gulf Coast Formations, Drilling Muds, and Commercial Clays

FIELD	Formation	Depth, Ft.	Quartz	COMPOSITION, PERCENT BY WEIGHT Clay	Albite	Pyrite	Miscel.
Sand Formations:							
Barber's Hill	Oligocene	.....	70	15 I	15	.....	.....
Ganado	Oligocene	5100	60-70	20-40 K	.....	.....	.....
Golden Meadows	Miocene	5300	60-70	20-30 B	10	.....	.....
Lake St. John	Wilcox	3398	90	10 M	.....	.....	.....
		3438	80	15 M	5	.....	.....
Loma Novia	Gov't Wells	2732	45	45 MM	10	.....	.....
		2750	50	15 MM	30	.....	.....
							5 C
Manvel	Marginulina	5355	60-70	20-30 B	5-10	1	.....
		5375	50-60	30-40 B	5-10	.....	.....
Segno	Wilcox	8040	60-80	10-20 MM	.....	5-10	5-10 X
		8030	70-80	10-20 MM	.....	.....	5-10 X
Sheridan	Wilcox	9384	50-65	15-25 X	20-30	.....	.....
		9405	65-80	10-15 K	10-20	.....	.....
Villa Platte	Wilcox	9844	70-90	10-20 H	5-10	.....	.....
		10182	65-85	10-20 H	5-10	3-5	.....
		10207	60-80	20-30 H	5-10	1-3	.....
	Haas	9014	70-90	10-20 M	5-10	.....	.....
Wharton	Kountz	5158	90	10 K	.....	.....	.....
	Lancaster	5140	50	50 K	.....	.....	.....
Wildcat	Eocene	.....	50-70	20-30 MM	10-20	.....	.....
Drilling Muds:							
Hastings Field	.....	.....	55	25 I	5	.....	15 C
Golden Meadows Field	.....	.....	50-60	30-40 B	5-10	.....	.....
East Placedo	.....	.....	20	60 B	.....	.....	20 C
Hackberry	.....	.....	35	60 B	.....	.....	5 C
Commercial Clays:							
Dakota Bentonite	.....	.....	.....	100 MM	.....	.....	.....
Grundite from Illinois	.....	.....	60	40 I	.....	.....	.....
Kentucky Ivory Ball Clay	.....	.....	50	50 K	.....	.....	.....
Monroe Wad Clay	.....	.....	50	50 K	.....	.....	.....
Muroc Green	.....	.....	.....	100 MM	.....	.....	.....
Tennessee No. 1 S.G.P.	.....	.....	.....	100 K	.....	.....	.....
Tennessee No. 7 Ball Clay	.....	.....	20	85 K	.....	.....	.....
Volcanic Ash from Gulf Coast	.....	.....	.....	100 MM	.....	.....	.....

B—Beidellite. C—Calcite. H—Metahalloysite. I—Illite. K—Kaolin. M—Muscovite.
MM—Montmorillonite. X—Unidentified.

ranging from zero to as much as 50 percent of the formation by weight.

Table I shows the X-ray analyses of a number of typical Texas and Louisiana Gulf Coast oil producing sands; also the analysis of several typical drilling muds and commercial clays used for drilling muds.

Table 2 shows the solubility of typical Gulf Coast drilling muds and oil producing formations in mud acids.

In plug-back operations or in new well completions where production is to be obtained from limestone, the use of acid through the perforations is common practice. The fracturing of lime formations adjacent to the casing caused by the perforating aids in the more efficient placement of acid and later in increasing the drainage face.

Explosive Methods

Explosives of one kind or another have been used to get or increase production in oil from clogged perforations and from openings through screen pipe. One of the more recent developments in the use of explosives is that of an explosive cord.

The use of an explosive cord for cleaning perforations was introduced early in 1941, giving operators another "tool" that has proved its merits in numerous applications. The explosive well-cleaning cord is a fuse containing a special, high-velocity, low-volume explosive. With the aid of a weight attached to its lower end as illustrated in Figure 3, the cord is lowered into the well on an insulated electrical cable until it is opposite clogged perforations. The charge is exploded by a small cap detonated from the surface by electricity.

The effectiveness of the explosive method in causing deposited cement, mud, paraffin, silt, etc., to be blown from the perforations is attributed to the high speed of detonation (2300 feet per second) which generates a sharp jarring action uniform in force throughout the length of the cord and projected laterally, as the quantity of explosive per linear foot of cord is small, the force of the explosion is not sufficient to damage the casing or liner, although care must be taken to use the cord properly. Best results have been obtained in wells where the fluid column has completely covered the explosive cord. Because of the great speed of detonation, the pressure induced by the explosion cannot be dissipated through open perforations rapidly enough to relieve the pressure on the clogged perforations. Thus the full force of the explosion is applied to all perforations, whether open, partly clogged, or closed.

In wells equipped with 5½ to 8⅝-inch diameter liners, two cords suspended side by side are detonated simultaneously. In smaller diameter liners and in old wells where liners are apt to be corroded and not up to standard in strength, only one cord should be used. It is also advisable to use only one cord in wells subject to sand trouble, even though the casing is of a large diameter. Other conditions that determine the number of cords to use are the size and number of perforations per unit area of liner and whether the liner is welded or seamless pipe. In cleaning multiple-zone wells having two or more perforated zones, a single cord is hung opposite all zones and additional cords usually are attached to the single cord so that two cords are opposite the perforated section. Explosion of the single cord in the blank sections of the casing or liner does not affect the pipe. Experience has shown that when the distance between zones is greater than 100 feet, it is not economical to clean more than one zone at a time.

To meet varying well conditions of depth, pressure and temperature, three types of cord—No. 1, Plain; No. 2, Reinforced; and No. 3, Wirebound, having tensile strengths of 113, 160, and 250 pounds per square inch respectively—are provided. The limit of cord length is approximately 500 feet. All three cords have equal explosive force.

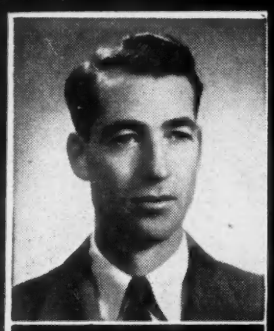
Other Methods

It has been found in some fields that it is much more difficult to establish consistent flow from wells completed through perforations, and this is particularly true when production is obtained from fine-grained, loose, unconsolidated sands. Under such conditions an inside screen or strainer has been set opposite the perforated section; and this requires special care in completion to avoid plugging the screen or slotted strainer. In fields in which conditions of this nature exist, production completions through gun perforations comparable to completions made exclusively with conventional screens and slotted liners have been obtained by using the following procedure: The liner is first run into the well on drill pipe or tubing with a wash-pipe assembly and releasing tool above, as shown in Figure 4. After it reaches bottom, circulation of drilling fluid is begun by the displacement of water through the tubing and wash-pipe, into the annulus between the inside screen and gun perforations, and out through the casing. After spotting a sufficient quantity of water on bottom, the liner is set by means of a packer

TABLE 2

Solubility of Rotary Drilling Muds and Commercial Clays in 15 Percent HCl and Mud Acid

Mud No.	Pool	County and State	Composition Percent Water	Composition Percent Solids	Percent Solubility of Dry Solids Mud Acid	Percent Solubility of Dry Solids 15 Percent HCl
1	English Bayou	Calcasieu, La.	65.5	34.5	67.72	15.15
2	University	Baton Rouge, La.	70.5	29.5	51.20	10.80
3	Port Barre	St. Landry, La.	63.9	36.1	50.44	10.85
4	Port Barre	St. Landry, La.	63.8	36.2	43.49	9.40
5	Jennings	Acadia, La.	93.1	6.9	52.82	11.49
6	Eola	Avoyelles, La.	74.5	25.5	46.17	7.65
7	Tepatate	Acadia, La.	76.0	24.0	47.07	10.39
8	Ainse la Butte	Lafayette, La.	47.2	52.8	30.40	7.63
9	Paradise	St. Charles, La.	64.5	35.5	61.93	10.00
10	Wildcat	St. Marys', La.	50.5	49.5	48.28	8.87
11	Wildcat	La Fourche, La.	61.3	38.7	55.32	11.19
12	Stark	Calcasieu, La.	61.3	38.7	54.12	8.79



Harold E. Cooper

Fred E. Cooper

J. W. Allen

Kenneth Flett

Seasons Greetings

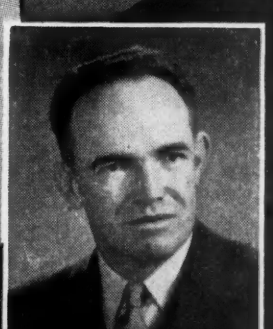
As we end this year of shortages and frustrations, we have a feeling of deep regret that we have failed to serve the industry in the manner, we hope is ordinarily expected of this organization. It is our hope that the coming year will be one, that will enable all of us to see "a job well done" when it ends.

Fred E. Cooper
Allis-Chalmers

Earl A. Woolbert

Howard Appleton

Guy E. Reed



H. B. Bloxom

C. F. Nelson

H. R. Kramp

Earl H. Cochran

liner hanger. Mud acid or other chemicals are then squeezed through the screen and perforations made for the purpose of removing any mud sheath or cement which may have accumulated behind the casing immediately opposite the gun perforations. The tubing or drill pipe is removed from the liner hanger by means of a releasing tool; and then, by washing, the mud and cement which may have accumulated behind the casing or around the liner is loosened and brought back into the hole by the flow of fluid from the sand. Wells which have stubbornly refused to flow prior to the above treatment have been completed successfully in a normal manner after this method has been applied.

Cleaning of wells with hot air is a practice that has given good results in the shallow sand fields in Ohio. It is reported that this method can be utilized at any depth, provided insulation is applied to conserve heat.

Gasoline and gas injected in wells under high pressure have been used to clean gun-perforated wells with varying degrees of success, the use of gasoline being confined to wells which accumulate paraffin or residues on the well face and in the gun-perforated holes. Where gas is available under sufficient pressure, the injection of this gas back through the openings (allowing a sufficient interval of time for equalization after discontinuing the injection and before releasing the column of gas) has set up sufficient "surging" as a result of the differential pressure developed to cause the successful cleaning of many wells. The use of gas in the manner described has been used in reviving flow in flowing wells which, after being temporarily shut down for a short period of time, have failed to flow upon being opened.

Conclusion

The importance of thorough cleaning of gun perforated wells cannot be overemphasized. To obtain successful results it is essential to apply proper clean-out methods, based on the kind and location of the accumulations in wells. Many failures to obtain satisfactory increases in oil production rates may be ascribed to misapplication of tools or methods or to application of orthodox procedures not suitable for correcting existing conditions. Furthermore, no single tool or method can remedy conditions in all wells. Experience has shown that good results are obtained in some wells, whereas in others the use of the same tool or application of the same procedure to overcome a comparable condition proves ineffective. Applications of combinations of methods often are successful, and in many wells success is obtained only after several methods have been tried.

Moreover, the application of systematic clean-out methods when the need is apparent makes it possible to obtain a better understanding of the characteristics of wells in obtaining maximum recovery.

Acknowledgment

The author wishes to express appreciation to J. D. Hughes and Val L. Forsyth for their assistance in furnishing material, and for reviewing and criticizing the manuscript. He wishes to thank Lane-Wells Company for permission to publish the article.

Reference

"Mud Acid—Its Theory and Application to Oil and Gas Wells," by Phil J. Lenhard, AIME, 1942.

Nitroglycerin in Water-Flood Work Is Kansas-Oklahoma Session Topic

THE relative merits of liquid and solidified nitroglycerin for various conditions in secondary recovery water-flooding work were discussed at a monthly session of the Kansas-Oklahoma waterflooding group at the Booth Hotel, Independence, Kansas, with approximately 100 operators and engineers present, as well as representatives from the U. S. Bureau of Mines at Bartlesville, Okla., and the U. S. Geological Survey, Tulsa. W. A. Heath, Earlougher Engineering, Tulsa, presided as group chairman. Following the general discussion a two-hour question period was held during which Paul Lewis of E. I. du Pont de Nemours & Company supplied the answers.

Lewis made it clear that the effectiveness of liquid and solidified nitro depends on the conditions encountered in individual wells and urged operators to secure all available well data so as to intelligently determine beforehand the type of explosive to use as well as the size of the shot.

Choosing the Explosive

"Under the practically infinite variety of conditions encountered in oil wells it has been found that one type of explosive may be better suited to a certain set of conditions than the other, as each has its own peculiar properties and in that sense one may be considered more 'efficient' than the other," Lewis declared. He cited examples in various fields to illustrate his point and said that in many cases where the explosive was said to have failed it was not the fault of the explosive but rather a case of misplaced confidence in a good explosive which was expected to do a job for which it was not suited.

Lewis stressed the safety factor in handling both liquid and solidified nitro and condemned the carelessness sometimes shown in the field in handling the latter. He said that many of the accidents involving solidified nitro have been caused by a lack of proper "respect" for the solidified product which, after all, is 92 percent liquid nitro plus gun cotton, and that it should therefore be handled with the respect accorded the liquid explosive.

In replying to questions from the floor concerning the effects of well shots, especially in water-flooding operations, Lewis cautioned against shooting wells promiscuously and declared that in some instances it has been reported by producers that water input wells are more efficient when shot selectively or, in isolated cases, where not shot at all. He illustrated on a blackboard the effects of bottom-hole shots using both liquid and solidified nitro, showing also horizontal and upward inclined planes of fracture. These conditions are governed by factors such as hydrostatic head, frangibility and bedding of rock, size of shot, selective loading density, etc.

Lewis stated that solidified nitro, despite its characteristic limitations, is an excellent oil well explosive if used in shells of not less than three-inch diameter, where temperature does not exceed 130° F. and where the pressure does not exceed 1000 pounds per square inch. Within that range it has the advantage over liquid nitro of lower density where low density is desired and a velocity to some extent controllable by pressure where pressure is controllable.

Hole Enlargement

Discussing selective shooting in secondary recovery operations, Lewis declared that when hole enlargement is the sole objective and where the inevitable fracturing is desired to be held to a minimum the shot must be so designed as to hold movement of the overburden to a minimum. Generally speaking, the liquid explosive may be considered as the more likely to give hole enlargement under all conditions.

Lewis advised as good technique where the maximum fracturing effect is desired and hole enlargement is incidental, to concentrate the explosive at the very bottom of the stratum to be fractured and, if sub-strata conditions permit, to deepen the hole to a point below the pay stratum to the extent of one foot for every ten feet of pay section, thus assuring maximum effect in the pay and minimum effect in the overlying strata.

"Selective shooting is desirable in either type of shot in a laminated structure, especially where sand beds are interlaminated with shale beds or where there is a pronounced variation in the degree of consolidation or in the frangibility of the rock, though it must be remembered that a shale break cannot effectively be blocked off simply by anchoring through it, especially if the shale be a thin band, only a few inches in thickness," he said. "In this connection and contrary to general belief, the loading density should be based on the frangibility of the rock rather than on whether it drilled easy or not. Generally, the rock that drills the easiest requires a heavier blow to fracture it than the rock that drills slowly, dolomite excepted. Soft, unconsolidated sandstones absorb and dampen out disruptive vibrations, whereas the hard brittle types of rock carry these vibrations and are fractured by them."

Chairman Heath announced that the next meeting of the Kansas-Oklahoma water-flood group will be held January 8, at Independence, Kansas.

FUNDAMENTALS OF INDUSTRIAL

Accident Prevention

Part 13-D

Material for Safety Talks

THE accompanying material has been provided for foremen, department heads and others in preparing safety talks for presentation to employe groups.

By C. L. HIGHTOWER
Safety Director, United Gas Pipe Line Company and Union Producing Company

THE GOOD THINGS OF LIFE

THE producing efficiency of gun-per-Christmas and then New Year. We are making plans, selecting gifts, deciding where we will go or what we will do. For many it will provide an opportunity for the members of the family to get together again. Brothers and sisters will gather at the family fireside, children will be home from college and others will enjoy the happy association with friends. The underprivileged will come in for a share of Christmas cheer, thanks to the good work of our welfare agencies and the generosity of friends and neighbors. These associations and the spirit of friendliness that prevails at this season of the year help all of us to realize and better appreciate the good things of life; the wholesome and comforting dependence of the family circle, the pleasure and enjoyment of real friendship, and the satisfaction that comes from worthwhile, constructive work.

Sometimes we must look at the negative in order to see the positive. The good is evident only by comparison with the bad. Safety is that way. It is difficult sometimes for us to fully appreciate its value without first reviewing the results of accidents. Already this year more than 90,000 people have been killed by accidents in the U. S. This means 90,000 homes made sad, and, at the present rate, there will be some 10,000 more added to the list before the year is ended. Accidents have no respect for persons or places. They happen to the rich as well as the poor and they take their toll in the home as well as on the highway and on the job. The automobile, which ironically was developed for man's convenience and pleasure, continues as the leading source of destruction.

The sad part of the story is that all of this death, maiming, sorrow and suffering are needless. Not a single death or injury has to happen. Every one could be prevented by care and forethought somewhere down the line. Safety! That's the answer. It is being preached, talked, and written about, but the converts seem pitifully few when we come to the practice of it. Safety may not be one of the good things of life, but health and happiness are, and they cannot be attained without SAFETY.

THE LITTLE FELLOW DOWN THE STREET

Johnnie used to skate by my house of evenings, his yellow curly hair waving in the breeze, his blue eyes smiling. I would watch him swing past, the picture of health and happiness, and envy his energy and zest for life.

He doesn't come by any more.

He was struck by a careening car as he was crossing the street on the way from school, a car driven by a heedless, irresponsible youth who dashed around a blind corner and bore down on poor little Johnnie before he had time to get out of the way.

Johnnie will never skate again. His left leg was crushed and they had to amputate just above the knee.

I went by the hospital to see Johnnie the other day. I found him propped up

with pillows, and although his face was white and drawn, he still wore that smile. It was I who had to fight to keep back the tears. Johnnie stuck out his little fist to shake my hand and he showed the courage of a thoroughbred. He'll get by. A fellow who can keep smiling after what Johnnie has been through, and in the face of the fact that he will have to use a crutch until he is grown and an artificial leg can be fitted, and won't be able to skate, run and jump like the other boys—a fellow like that can't be a failure. But what a handicap. How much further he could go if he had that other leg to take him there.

Whose Fault?

They arrested the boy who ran Johnnie down. I didn't go by the jail to see him, but Johnnie's father did. He's only 17 himself, eight years Johnnie's senior. He was heartbroken over what happened and cried when they told him Johnnie was going to lose a leg. Poor boy, he was not deliberately careless, he has just never been taught to drive the right way. Neither Johnnie nor his father are bitter toward this other boy, yet they know, of course, that his recklessness has blasted Johnnie's life, but they know also that somebody else failed. Not the boy driver, but the father and mother who failed to teach or who taught improperly by example. They are to blame.

I'll miss Johnnie whizzing past my house on summer evenings as he used to do but he'll be back to see me anyhow. I can see him now, hobbling up on his crutch, the same yellow curly hair matted about his forehead, his blue eyes smiling, as he comes to tell me how the team won another football game because his pal Frank caught a long pass. Johnnie may live a lot of life secondhanded but he'll live it just the same.

He's like that.

THE WAY TO SAFE DRIVING

Twenty-eight thousand new coffins were required last year to bury the nation's automobile accident dead. Twenty-eight thousand men, women and children—enough people to fill a good sized town.

If that number of people had been killed at one time, if a cyclone should swoop down on a town of 28,000 people and completely wipe it off the map, the whole world would be shocked. Newspapers would feature stories of the catastrophe for weeks. The entire nation would mourn such a deplorable loss of life. Yet nobody gets very excited about the 28,000 killed in automobile accidents each year. These deaths occur one or two at a time and the stories of the accidents are stories of recklessness, drunkenness, and irresponsible driving. They lack the dramatic appeal and news interest of a catastrophe. But to the victims and the remaining members of the family death is very real. Its influence is sinister.

Too bad, you say, that all of these people have to get killed, but how does that affect me? I keep my car in good condition, and I am not going to have an accident. No doubt, each of last year's accident victims left home in the morning secure in the belief that he would return whole and sound that night—but death decreed otherwise.

There is an element of uncertainty about life itself that we can not eliminate. Perhaps we cannot greatly influence the driving habits of other motorists, but we can correct our own and in this way eliminate much of the uncertainty of highway travel.

Safe Driving Rules

The way to safe driving is not difficult or complicated. It involves certain well defined principles that can be easily learned and as easily put into practice. These are as follows:

1. Practice the Golden Rule. "Do unto others as you would have them do unto you." Show the same courtesy to your friends and neighbors on the street and highways as you would accord them in your home. Put courtesy into practice. Do not attempt to frighten the pedestrian out of his wits with your horn. Wait for the other fellow to pass at the intersection; do not try to beat him across. Do not weave in and out of traffic; stay in line. Never do the things you would blame the other fellow for doing.

Over 2000 years ago Confucius preached the Golden Rule but he expressed it backwards. Some people have never learned to practice it either backward or forward.

2. Watch these five things about your car:

A. The lights.
B. The horn.
C. The steering.
D. The tires.
E. The brakes.

They are the five things most likely to cause an accident if they go wrong.

3. Drive with your car under control. Speed is relative. Sometimes it is safe to drive 60 miles an hour on a wide, straight highway when visibility is good and traffic is not heavy, and then at other times it is dangerous to drive 15 miles per hour. It depends on conditions—the weather, the road, the traffic, you and your car. Just keep your car under control at all times. Keep your eyes on the road and your mind on driving.

4. Always reduce your speed when darkness approaches. Visibility decreases as the sun goes down.

5. Watch the highway signs and markers and observe the warnings.

6. Make more frequent use of your head, your heart and your hand and less use of the horn.

7. Remember, you are teaching others by example—your own or somebody else's children. Teach them the right way by driving the right way.

HOW FAST IS TOO FAST?

There seems to be a difference of opinion as to "How fast is too fast." Many drivers consider that they are not speeding when they are traveling under 70 miles per hour. No doubt this conception of speed has developed largely because car manufacturers are advertising cars that will make 90 to 100 miles per hour and the drivers have come to feel that when "jogging" along at a 65- or 70-mile clip they are not going too fast, inasmuch as they are staying under the maximum speed advertised by the car manufacturers.

It is also true that to a certain extent a man is controlled by his subconscious and the riding comfort that has been built into the new cars and the ease with which a speed of 60 or 70 miles per hour is attained really makes it difficult for the driver to "hold down" to a safe speed unless he makes a conscious effort to do so.

Perhaps the ideas of most drivers concerning speed would change if they stopped to realize that about 90 percent of all fatal collision accidents occur when one or the other vehicle or both are traveling at high speed.

The realization that the impact of a car traveling 60 miles per hour with a stationary object is equal to the impact of the same car if driven from the top of a ten-story building might cause some of the "speed-minded" to slow up and think. When he does think about automobile accidents, the average driver thinks of smashed fenders or broken bumpers. One must go through the sad experience of extricating a battered body from an equally battered and smashed car before he can visualize himself and his own car involved in such a mishap.

In speaking of excess speed we do not mean alone speed in excess of that established by law, but speed in excess of that which is safe for the conditions which exist. First, it is well to remember that the majority of the highways we have today were constructed several years ago and were designed and built for top speeds of 40 to 45 miles per hour. Also, it is well to remember that nothing less than an enclosed race track is safe for the speeds of 90 to 100 miles per hour which many car manufacturers claim their automobiles will make.

There are times when 50 or 60 miles per hour may be safe, and again there are times when a speed of 20 miles per hour is not safe. The driver must take into consideration weather conditions, the width and kind of roadway on which he is traveling, visibility, traffic conditions, the condition of his own car, and his own driving ability in determining the speed which is safe for the particular time and place.

In summing up, we might say that speed is a question of knowing traffic rules and regulations, being thoroughly versed in safe driving practices, being considerate of the other fellow, and the application of common "horse sense."

MORE HORSE SENSE THAN HORSE POWER

Pride in his possessions and a natural tendency to show off are two of the average man's characteristics. Few of us would display these traits on the highway if we stopped to think that the use of a little common sense with the gasoline would increase the probability of returning from our journey by approximately 91 percent.

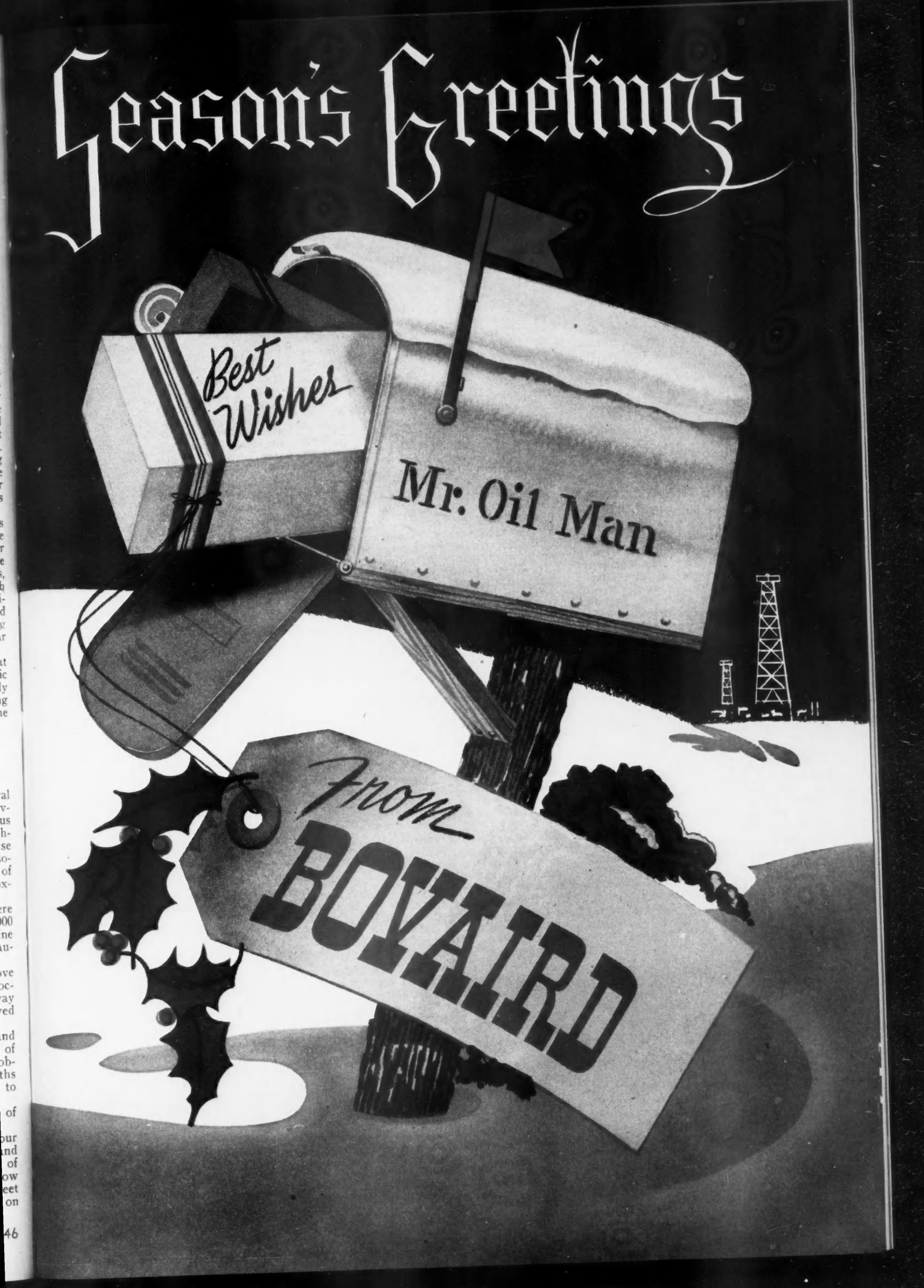
Speeding and reckless driving were the contributing causes in some 20,000 deaths by automobiles last year, or nine out of every ten fatal accidents with automobiles.

In analyzing accidents from the above causes we find that 78.7 percent occurred on straight stretches of highway and that 93.9 percent of the cars involved were apparently in good condition.

Realizing the hazards of speeding and the possibility of mechanical failure of the car every one of us would say "observe the speed laws," but the deaths continue to mount daily from failure to observe.

Following are some of the hazards of fast driving:

1. A car traveling at 65 miles per hour is covering 100 feet per second and requires approximately 255 feet of clear highway for stopping. How often do you see danger 255 feet ahead? How many cars will stay on


Season's Greetings
Best Wishes
Mr. Oil Man
From
BOYARD

the highway for 255 feet after the steering knuckle has dropped off or a tire has blown out?

2. A car rounding a curve at high speed is opposing the law of centrifugal force and puts a severe strain on the tires and driver to keep on the right side of the road.

Below are a few simple suggestions for prevention. How do you and your car stand up?

1. Observe all speed laws on highways and in towns.
2. Use tires in good condition and properly inflated for current weather conditions.
3. Have brakes inspected and adjusted at least every 3000 miles.
4. Give car a complete mechanical inspection by a competent mechanic at least every 3000 miles.
5. See that lights (both front and rear) are burning and properly adjusted.
6. Keep windshield wiper in good working condition.
7. Observe and obey all highway and street warning signs.
8. Do not try to mix gasoline and alcohol.
9. Know and observe all courtesies of the road.
10. Use a little horse sense with the horse power of your car.

WHO PREVENTS THE ACCIDENTS?

There should be individual pride in a good safety record because it is the individual employe working for safety who makes the good record. Likewise, it is the individual who has the accidents. The record of the crew or the district may be unfavorable, but as a rule the accidents that bring about the bad record involve only two or three employes.

What is the significance of this? First, it indicates pretty clearly that this problem of preventing accidents is largely an individual problem; and, second, it impresses upon us the fact that it takes every "blooming" one of us to get the job of safety done.

If we have 50 men in a group and only 49 of them are sold on safety, we can not hope for a perfect record. The indifferent attitude of this one individual will sooner or later set the stage for an accident and somebody will get hurt . . . maybe an innocent man who himself is interested in safety and doing all he can to prevent accidents. The new man particularly will be susceptible, and in time the enthusiasm of the entire group will be retarded and vigilance lessened. Without question it takes the wholehearted support and sincere effort of 100 percent of the employes in any group to make a 100 percent safety record.

We have, then, two very good reasons for promoting 100 percent safety interest:

1. Self protection.
2. The desire for a good department record.

Convincing the Skeptic

Winning the safety skeptic over to your way of thinking is not a difficult task.

First, let the other fellow know that you believe in safety and that you are sincere in wanting to do something about it. Point out the unsafe practices you observe and show the man the right way. Often he does not recognize the hazard involved. Help him to understand how an accident would affect him and his family; give him a picture of the hardships that a widow has to go through, tell him how an accident can cripple a man up so he can't work any more, and point out how any injury that causes lost time cuts into his pay check. The man who can't appreciate the need for safety apparently doesn't realize the effects of accidents. These pointed facts will help him to get the story.

The man on the job prevents the accidents. Safety meetings help us to develop a safety consciousness, contests maintain our active interests, and protective equipment safeguards us against specific dangers, but in the final analysis, it is what the man on the firing line does or doesn't do that determines whether or not he is going to have accidents.

In addition to the obligation we owe ourselves, our dependents and our company to make the crew 100 per cent safe, we also have individual responsibilities for safety which may be summed up as follows:

1. Active participation in all safety meetings.
2. Reporting unsafe practices and conditions that we cannot correct ourselves as promptly as possible so that they may be corrected.
3. Reporting all accidents, no matter how minor and receiving first aid treatment.
4. Qualifying to render assistance in injury cases by taking the company's first aid training course.
5. Getting plenty of sleep and rest, following temperate living habits and keeping physically fit and mentally alert.
6. Keeping informed on our jobs and learning the safest and most practical methods.
7. Cooperating with fellow workers, the foreman and all employes of other departments.
8. Practicing safety off the job and passing along accident prevention information that we receive at safety meetings to members of our families and to our friends and associates.

HASTE AND ITS RELATION TO ACCIDENTS

We are living in a fast age. Even 15 years ago we couldn't visualize trains that would travel 100 miles an hour and airplanes with a cruising speed of 300 hundred miles per hour, but today these are a reality.

Along with the increased speed in transportation facilities, we have "speeded up" business as a whole. Our manufacturing plants are turning out more and better goods at a faster rate. All along the line from the production of the raw material through the process of manufacture and delivery of the finished product to the consumer we have "speeded up."

The speeding up process has brought about many advantages. It has lowered unit costs and placed many luxuries within reach of the average man. Also, since we are doing more in less time it gives us more leisure for play, study and self improvement.

There is a vast difference, however, between planned speed and confused haste. One is the result of carefully thought out procedure, where the work progresses in accordance with a definite schedule, while the other is the result of improper planning or no planning at all. Planned speed gets the job done efficiently, economically and safely. Confused haste brings about loss in production, wasted material and injuries.

Unnecessary haste plays an important role in the cause of most serious automobile accidents—and the tragedy of this is that most of those who go helter-skelter have no special reason to hurry, but are instilled with a mad desire to make haste although they know quite well that when they arrive at their destination, if they ever do, they will have plenty of time to sit around and just wait. If we have to be at a certain place at a certain time, we should leave a little early instead of a little late.

Haste in our everyday work should be employed with caution. If we would all perform our daily duties with thought and careful planning, emergencies would seldom arise.

Haste is the basic cause of many accidents both of minor and major proportions. The man who in his haste fails to see danger in his path, falls or stumbles. The workman in his haste to descend from the tower misses his step. The office man hurriedly attempts to close a drawer or pass a desk and catches his hand or bruises his leg. A man in his haste to get to the job finds after arriving he has forgotten the tools necessary to do the job correctly and rather than go back, uses some improvised, makeshift tool. The tool by its very construction is unsafe and usually results in the workman being injured.

It was a wise man who said, "Make haste slowly."

WORKING TOGETEHER

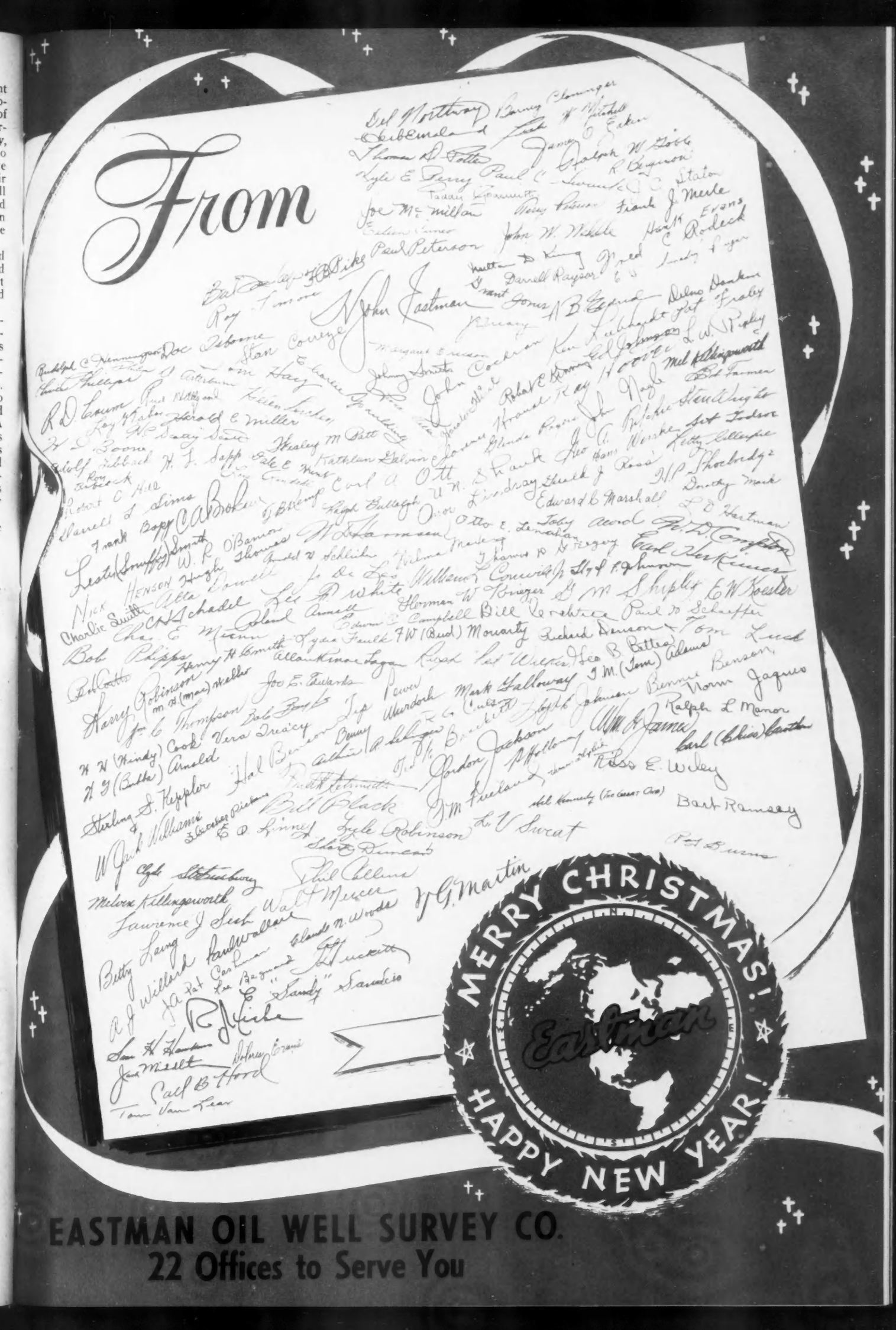
The man who plays first fiddle in the orchestra might be the best musician in town but unless he can harmonize with the other members of the orchestra, he is a detriment rather than a help.

The same is true of the individual in a crew or gang. A man may be able to carry the most pipe, string the most service line, or make the best weld, but if he does not fit in, and if he cannot harmonize his efforts with those of the group so that the result is a smooth-running organization, then that individual's value is materially reduced.

Working together is one of the most important things in business. No organization is large enough or efficient enough but that wholehearted and efficient cooperation is necessary to insure effective results.

From the standpoint of safety this question of working together is perhaps the most important. Not knowing what is expected to be done or what the other fellow is doing for the moment has caused many accidents. The following factors are essential to insure cooperation of effort where a group of two or more people are working together:

1. The purpose of the job or work should be fully understood by every member of the crew.
2. Plans as to how the work is to be conducted should be thoroughly discussed by the group before the job is started.
3. Any member of the crew who is unfamiliar with the manner in which certain phases of the work are carried on should have this explained to him before the job is started.
4. Signals should be agreed upon for lifting and lowering, where material is being handled by two or more persons.
5. There should be a given place for tools and equipment and each member of the crew should see that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everything is kept in its proper place.

6. Any unusual condition which develops should be reported immediately by the person observing it to the other members of the crew. Most serious accidents occur because every condition is just right at the time for such an accident.
7. Personalities should be forgotten and any misunderstanding or petty grudge should be discussed and gotten out of the way before a job is started.

POISONS AND ANTIDOTES

One of the requirements of a good first aid student is that he know poisons and their antidotes. The knowledge of correct treatment for poisons is like that of artificial respiration—something we do not use every day, but when needed will not wait for you to read a book of instruction.

Poisons fall into four general classifications. Following are the types, symptoms, and treatment for each:

Corrosive: Leaves a stain on the lips and mouth. Patient will complain of burning pain in throat, gullet, and stomach.

Give baking soda in water or lime mixed with water if the poison is from an acid. If from an alkali, use vinegar or lemon juice. Put oil on the corroded parts. Do not use any emetics (vomiting) in this type of poisoning. Treat for shock.

Irritant: Symptoms are the same as for corrosive poison except that the lips and mouth are not stained.

Give an emetic (make patient vomit) by running finger down throat. Give salt water, mustard water, white of eggs, alum water, oils or epsom salts. Do not give oil if poisoning is from matches. Treat for shock.

Alcohol: Patient is unconscious (partial or complete) face flushed or bloated, sometimes pale, skin cold and moist, pupils of eye regular or large, eyeballs red.

Give emetic (vomiting) and treat for shock.

Carbolic Acid: Patient will vomit and suffer much pain; strong smell of carbolic acid; tongue and mouth will be burned white or black.

Give patient vinegar, soapsuds, raw whites of egg in water, salt water, mustard water, alum water, epsom or glauber salts. Give emetic (vomiting). After vomiting, patient may be given milk. Treat for shock.

In all cases call a doctor.

SCALDS AND BURNS IN THE HOME

Fatal accidents in the home take a yearly toll second only to that of automobiles. Statisticians tell us the kitchen is the most dangerous room in the house and that scalds and burns are second only to slips and falls in severity. We naturally expect all scalds and burns to occur in the kitchen, but it is surprising that the bedroom is crowding the kitchen for first place in the number of fatal burns.

Following is a list of the causes and suggestions for prevention:

1. Fat frying. Pans on top of stove should have handles turned in so that children cannot grasp them or so that a grown person will not brush against them. Potatoes and other similar food should be fried with only the housewife in the kitchen. Burns from flying grease are painful.

2. Cook stove should have a vent to carry off unburned gases. Burners should be kept in proper adjustment to prevent an excess of unburned gases with their danger of carbon monoxide.

3. The tops of roasters or other cooking dishes should be taken off far side first so the steam will escape away from the face.

4. Never use flexible gas tubing if possible to avoid. A running child or careless adult may jerk it loose, causing gas to ignite.

5. Nobody should smoke in bed. It is easy to drop off to sleep and wake up in an inferno.

6. Never go to sleep with an electric heating pad turned on. The thermostatic controls do not always work and any pad is hazardous when damp.

7. Radiant electric heaters should not be left on at night. Any small aberration of the reflector can focus heat on a point like a burning glass and ignite curtains or bed clothing surprisingly far away.

WORRY

When things go wrong, worry won't help. Get busy and find the answer to your trouble. Here are several good rules—remember them:

1. Be sociable. Making and keeping friends help you to forget your troubles.
2. Don't let fear tell you what to do. The bravest man is he who faces trouble in spite of fear.
3. Concentrate on your work while you are working. Concentrate on play when you play.
4. Use your mind. The healthy brain is one that gets lots of exercise.
5. Simplify your work and play. Cut out confusion.
6. Get yourself under control. Never cultivate hate, fear, and anger.
7. Don't be timid. Be courageous and self-confident. You can do it if you try.
8. Never turn your back to situations that need to be faced.
9. Avoid building up defenses, making alibis and dodging consequences. They get you nowhere.
10. Stop thinking only of yourself.

Remember, worry is one of the important causes of accidents.

THERE ARE NO LITTLE THINGS

A great man, given to the performance of great deeds, once said, "There are no little things in this world." To Abraham Lincoln, nothing was trivial or unimportant. Every task, every obligation to him was worthy of the best thought, the most conscientious effort. Big decisions were made only after a careful study of all available facts, because he knew that big enterprises failed due to the neglect of minute details.

In expressing himself in these words, Lincoln no doubt was thinking of success and failure and reckoning the difference in terms of the care of neglect to those details so often looked upon as small and unimportant. Although Lincoln was probably not speaking of accidents, it is nevertheless true that the neglect of details, inattention to the so-called little things, is responsible for many of our injury cases. To save a few seconds the driver races to beat the other car to the bridge. Maybe he makes it. He has the satisfaction of having beaten the other fellow at his own game—of "getting by" with something. But suppose the race is a tie? The difference in both cases is but a matter of a second, but *what a difference in results.*

The board with the upturned nail is passed by and stepped over time after time. It is such a little thing. No one has time to look after such details as the job must be completed. There's no time to lose. Perhaps the danger is "sidestepped" by the man who leaves the board there. Sometimes it is stepped upon and the nail bent over without anything happening. But many times an innocent victim—weeks or months later, perhaps—painfully finds the hazard buried under accumulated debris or dirt. Usually the worst is a painful puncture wound and a day or two in bed, but sometimes it causes infection, lockjaw, and even death.

In the beginning, it was a harmless little nail, but considering the damage done—pain, suffering, and maybe death—"are there any little things?" Good housekeeping — the practice of keeping things cleaned up, having a place for everything and keeping everything in its place—is but a question of attention to the details of our job and the place where we work. It's doing the small job as efficiently as we do the big one and completing them both by "cleaning up."

Every job, every individual task, is made up of a series of detailed steps or processes. When we slight one of these progressive steps, or attempt to "short cut" by neglecting it altogether, the finished job—whatever it may be—will not reflect the results of which our best efforts are capable. Any way we look at it—from the standpoint of the individual job, from the safety angle, or from the long range view of our life's work—we are forced to admit Lincoln was right: "There are no little things in this world."

POOR VISIBILITY A CAUSE OF AUTOMOBILE ACCIDENTS

The probability of an accident resulting in fatal consequences is much greater in periods of dusk and darkness than during daylight. Last year this probability was practically two-thirds greater. Approximately 12,300 people were killed last year in automobile accidents which occurred during periods of dusk and darkness.

Winter months usually produce more fatal and serious injuries also, because rain, sleet, snow, and cloudy weather limit visibility.

Recognizing the increased hazards under such conditions, the question is: "What can be done about it?"

First, and most important, is to reduce your driving speed at night. Your visibility is reduced by more than one-half and it is only reasonable to think that your driving speed should be cut down. What is a safe speed for night driving? This depends upon the road, traffic, the weather, and the driver, but under any conditions 40 miles per hour should be the maximum speed.

Drivers can often avoid many of the night driving hazards by planning their work and time so they will not have to travel after dark.

Other suggestions are:

1. Drive to the right of the road.
2. Maintain headlights in good condition.
3. Do not park on highway.
4. Give wide berth to "one-eyed" cars.
5. Avoid traveling in rain and snowstorms if possible.
6. Keep your windshield wiper in working order.
7. Do not drive when sleepy.

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AIME Sessions

■ CONTINUED FROM PAGE 32

will be limited by free gas saturation of 32 percent at 200 pounds per square inch reservoir depletion pressure.

Our Auxiliary Petroleum Reserves

By H. H. POWER, chairman, Department of Petroleum Engineering, University of Texas, Austin.

Decline of this country's petroleum reserves has led to the development of auxiliary sources of substitute products. Most popular among these processes are: (1) hydrogenation of coal; (2) carbonization of coal; (3) development of "tar sand deposits"; (4) oil shale deposits; and (5) modernization of the Fisher-Tropsch Process. The progress in development and research together with costs have been published on these processes. Direct comparisons of economies are not entirely possible since the plants vary in size from pilot plant to full scale operations. Also, statistics involving obsolete plants are not comparable to those of modern plants. However, the broad picture permits a tentative conclusion as to the competitive importance of these methods with the present refinery processes.

It is realized that these new processes will not become prominent until they become competitive with our domestic and foreign supply of oil. The $15 million Fisher-Tropsch plant of Hydrocol at Brownsville, Texas, scheduled for completion next year, together with other large scale operations proposed elsewhere, are indicative, on paper at least, that synthetic gasoline products may soon be competitive with refinery products. Economic conditions of supply and costs in this respect are still questionable.

The conversion of natural gas to gasoline is considered as an obvious intermediate step to the conversion of coal which should give a substitute reserve vastly in excess of that obtainable from natural gas. Developments along these lines indicate that this process may become of greater competitive importance in the next few years.

The conclusion is reached that research and development of these processes is necessary in order to provide a reserve for fuels and lubricants in times of national emergency.

Gas Developments and Trends in South Texas

By C. R. WILLIAMS, vice president, The Chicago Corporation, Corpus Christi, Texas.

The young, greatly-expanded natural gas industry is looking forward to an unprecedented position in the postwar era with ample reserves of raw material. Long and vigorous research conducted principally by private interests has expanded frontiers to a horizon never before anticipated.

It all began as an unwanted fondling when the driller's bit in his search for oil encountered gas sands instead. The source of supply soon exceeded the demand . . . which in most cases was too far from the supply to make it of any value with the limited facilities of delivery. Gas used commercially consists almost entirely of methane and ethane, the former of which condenses into a liquid at —259° F., while the latter condenses at —128° F., both at atmospheric pressure. Natural gas as produced ordinarily contains varying amounts of propane, butane, pentane and heavier hydrocarbons, some of which are extracted to be included in motor fuels, while others are used as liquefied petroleum gas.

Because of its convenience in use, it is thought of a a fuel, both for domestic and commercial use. While it is developing into a source of raw material for the manufacture of rubber, plastics and carbon black, it has been the butane and propane constituents which are used as the raw material.

The estimated natural gas reserves of the U. S. are approximately 150 trillion cubic feet, the South Texas area alone having between 25 and 30 trillion cubic feet in reserves. The present trend shows sufficient supply for a period in excess of 30 years, with the potential supply increasing annually, and it is probable that gas will continue to maintain a reserve ratio substantially in excess of production. Consumption in the past four years has increased more than 50 percent. Conservation measures in gas producing states are assuring adequate supply, and research in natural gas is continuing to elevate the standard of living.

The Calculated Effect of Pressure Maintenance on Oil Recovery from a Solution Gas Drive Reservoir

By ROBERT L. HOSS, graduate student, University of Texas, Austin.

The only driving mechanism assumed to be active in the Fullerton field, Andrews County, Texas, is that of solution gas. The basic differential equations used in the calculation of performance histories of this field are those developed by Muskat. Information used in these calculations was taken from reports by the Fullerton Engineering Committee. Areal extent considered in this anticlinal structure was about 30,000 acres. The average depth is 6800 feet. Production is from the Lower Clear Fork, a dolomitic limestone of Permian age. Productive volume is 3,473,585 acre feet, containing an estimated 1,189,600,000 barrels of oil in place initially. Fluid characteristics of all three zones are similar and in this analysis all three were considered as one zone with an average thickness of 122 feet. Permeability ranges from 6.7 to 12.6 millidarcys and the porosity from 7.7 to 11.4 percent. Initial reservoir pressure was 3000 pounds per square inch (gauge).

The equations in differential form express the change in residual oil saturation and gas-oil ratios as a function of reservoir pressure. These are based on Darcy's Law and those concepts of flow of single and multiphase fluids through porous media. This direct numerical integration by a step-wise method is an improvement over the former trial-and-error process usually employed. Values of the variables are taken over short pressure decrements of 100 pounds per square inch and substituted in the equation to reduce the residual oil saturation to some final value. Once the saturation is calculated, other functions may be obtained. By placing the reservoir performance on a time basis, an estimate is had of the producing life of the reservoir and the effect of the pressure maintenance employed.

Salt Water Injection and Pressure Maintenance in the East Texas Field

By WINFIELD S. MORRIS, vice president, East Texas Salt Water Disposal Company, Kilgore.

The East Texas field is a water-drive type reservoir in which the movement of water under various rates of withdrawal in relation to the bottom hole pressure has been reduced to a mathematical equation. It is possible to predict the pressure production relationship within reasonable limits of accuracy.

As a means of disposing of large quantities of salt water produced in the field, and also as a method of reducing the net withdrawal of fluids from the reservoir, a field-wide program of subsurface salt water disposal is in operation. The first operation to return salt water to the Woodbine reservoir started in June, 1938, and by the end of October, 1946, there were 79 injection wells in use. Approximately 530 million barrels of water have been returned to the Woodbine sand. During November, 1946, 91.6 percent of the total water produced was returned to the sand.

The bottom-hole pressure in the field showed an increase of 14.91 pounds per square inch during the year 1945, and in the first ten months of 1946, the pressure has increased 1.63 pounds per square inch. Since the Salt Water Disposal Company became active in October, 1942, the pressure of the reservoir has decline only 2.93 pounds per square inch, notwithstanding the production of over 528 million barrels of oil during that period, which is at the rate of more than 180 million barrels of oil per pound pressure drop.

The salt water disposal program is a conservation measure worked out by the oil operators and the Texas Railroad Commission. It is estimated that the recoverable reserves have been increased by more than 600 million barrels of oil as a direct result of the project.

What Management Expects of an Engineer

By A. C. RUBEL, vice president, Union Oil Company of California, Los Angeles (In absentia).

Management expects engineers to fit themselves to become a part of management. It is a long, difficult road to the top for the purely technical engineer, but almost unlimited opportunities offer agressive men openings for higher positions. The engineer is expected to have adequate technical background training and practical experience to back up his education. He is expected to learn the art of human relations and become a leader in his organization. Working hours for the engineer cannot be predicted, and he is expected to do his work when necessity demands. His thinking along technical subjects cannot be limited to eight hours each day. There can be no 40-hour week for the aspiring engineer.

Independent thinking on the part of the engineer to help further scientific development in the industry is fully anticipated just as much as it is expected the engineer will keep himself abreast of advancements in his field. It is through its engineers that management expects constructive criticism. The art of presentation is of great value and should be studied carefully.

Engineers are expected to add their technical skill to that of civic development to bring about better local conditions. There is no room for unions in the engineering profession because of the managerial part played by the engineer. Management expects engineers to be adequately paid for their contributions to their companies. About the best available expression in summary of what management expects of engineers is the advice given by John Suman, former vice president of Humble Oil & Refining Company, to newly employed engineers, "Your job is to get my job."

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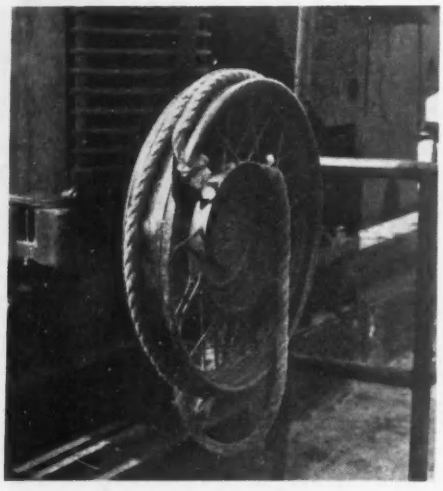
Auto Wheel Eases Engine Cracking



ENGINE STARTING

Adaptation of the rope starter popularized by outboard motors to the starting of pumping engines has led to the use of automobile wheels as drums on which to wind the spinning rope. Where drop-center rim wheels are used, the grooved center tends to cramp the rope, making it hard to pull free and increasing the possibility of accident. Where such a wheel is used, the welder for one company cuts a strip of light tank steel long enough to go around the rim, welding it across the groove so as to form a smooth surface on which to wind the rope.

The filler strip adds little additional weight to the wheel, and presents a smooth gripping surface in marked contrast to that of the groove, where the ends of the spoke nipples project to form an irregular contour which not only wears the rope quickly, but also aids in jamming the rope if enough turns are used to insure spinning the engine.

Inasmuch as each engine is equipped with a hand crank which remains with the engine, it was little trouble for the welder to fabricate the starting device shown. The stub end of the crank carrying the dogs which engage the engine crank shaft is cut off at a convenient length sufficient for the wheel to clear the radiator.

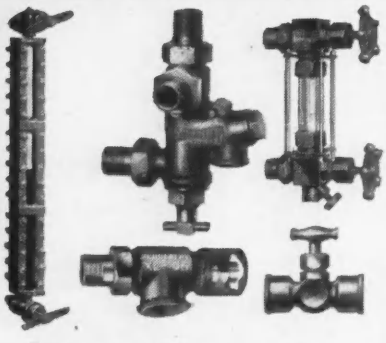
$5.00 is paid for each illustrated acceptable contribution. Mail to The Editor, THE OIL WEEKLY, P. O. Box 2608, Houston 1, Texas

Dual Stacks From Casing

BOILERS

Overcoming the problem of having to find or build a new stack for his boiler during the period when such materials were obtained only with difficulty, one enterprising operator in a Canadian field constructed one using two lengths of large size casing. The two lengths of pipe were clamped together, their bottoms contoured to fit the curved surface of the boiler, then welded in place. Held in position by conventional braces, the stack serves the purpose well, providing ample draft for the heating required of the installation.

PENBERTHY
QUALITY
PRODUCTS



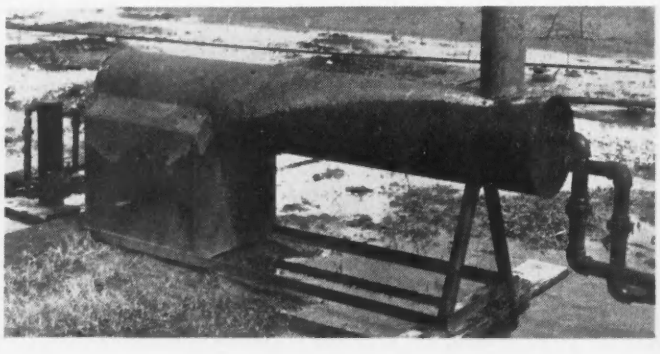
Penberthy liquid level gages of various types—injectors—ejectors—all so widely used throughout the oil industry because they have always been dependable under the most severe service conditions.

All are of rugged construction and made by an organization with 57 years experience in the manufacture of quality products.

See Pages 2450 to 2455, Composite Catalog

PENBERTHY INJECTOR CO.
DETROIT, MICH. Canadian Plant WINDSOR, ONTARIO

Improved Flow Line Heater Efficient, Inexpensive



FLOW-LINE HEATER

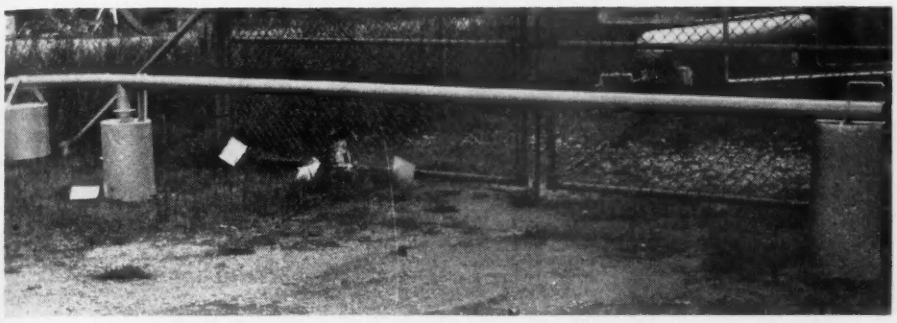
Possible overheating and consequent charring of oil in the inner return bends of a flow-line heater are avoided by setting the heater on an oven or combustion chamber in which the gas is burned, allowing the products of combustion then to pass into the barrel of the heater and contact the coils.

The heater consists of a barrel of 14-inch pipe, with a Dutch oven or firebox of light tank plate about one-third the length of the barrel. The base of this oven contains the gas burners, with air inlet at the edges of the supporting angle-iron frame. A slot cut in the barrel permits the hot gases to enter the barrel near the outer end, directly above the gas regulating valve. Flow is through the barrel to the 6-foot stack of 6-inch pipe, welded to the barrel so as to be self-supporting. Both oil lines are tack welded to the disk closing the stack end of the barrel which is carried on a collar slipping within the barrel so that the lines may be pulled for inspection or repair without dismantling the heater.

A disk, pivoted near one edge, serves as cover over the hole in the Dutch oven through which the burners are lighted. Burners may be changed by removing the bolts holding the assembly in place, and then lifting the heater enough to free them. Fire brick, laid flat under the burners, conserve heat and extend burner life.

PRODUCTION HINTS

Gate Guard Prevents Unauthorized Use of Roads



LEASE PROTECTION

Damage to the yard gates by casual traffic using the road spur as a convenient spot in which to turn cars around is prevented by one company by mounting a road block about three feet in front of the gates. The block consists of a length of three-inch pipe, long enough to cover the wide gateway. A pivot is provided near one end, with a counterweight sufficient to equalize the bearing on the pivot pin. A heavy brace, carried in the concrete filling of the pivot support post, takes the thrust if the pipe is struck, and prevents damage to the pivot.

The free end of the pipe rests in a shallow saddle formed in the other supporting post, in which a stop is carried to slightly above the top of the pipe to prevent swinging past the desired arc. Means for padlocking the bar at this end is provided, so as to eliminate unauthorized swinging of the unit.

The pipe is heavy enough to stop a slowly moving car and, even if bent, may be readily straightened cold. The pivot point and distance from the gate to be protected are so chosen as to permit the bar to be swung at right angles to the gate without contacting it. The support behind he pivot also acts to prevent over-travel of the unit when it is being opened to admit traffic to the yard.

Relief Valve Setting Insures Maximum Safety

RELIEF VALVES

Relief valves on high-pressure gas lines must be located at points where the possible discharge of considerable quantities of gas cannot create either fire or personnel hazard, and where the vented gas will be dissipated as quickly as possible. One company, placing its relief valves as far as possible from operating units, departs from the usual placing of the dual vents on the outlets from the valve. Instead of pointing these short pipes upward, they are set so as to project at an angle of about 45 degrees below horizontal.

Such setting insures immediate drainage of any hydrates formed during the blow, and also prevents rain from entering the pipes and accumulating on top of the regular diaphragm, which would retard operation by adding deadweight to the spring load on the valve, or would block the area in the recess holding the spring, and thus prevent the spring from being compressed. By aligning the vent pipes with the prevailing winds—when such setting does not direct the blow toward other units—the areas in which explosive concentrations of gas are maintained even momentarily are kept to a minimum. The elevated position of the valve aids in venting gases above normal head level.

INCREASE PRODUCTION
Clean Out with a
MILLER Sand Pump

A Quarter of a Century with thousands and thousands in satisfactory use prove its World-Wide popularity.

Miller Sand Pump Co.
General Office Box 4516
OKLAHOMA CITY 9, OKLA.
EXPORT OFFICE
30 Rockefeller Plaza
NEW YORK CITY 20, N. Y.
See Composite Catalog Page 1907

Having trouble preventing connection leaks?

You need RECTORSEAL, the chemically compounded sealant, developed especially for oil industry thread and gasket connections. It is composed of 15 synthetic, organic chemicals to withstand high pressures and temperatures; to provide high lubricating value for spinning up pipe; to be impervious to petroleum fractions; to maintain a plastic elasticity that will not "freeze" the connection.

Ask your supply store for RECTORSEAL No. 1. Use it on all connections for positive leak prevention.

RECTOR WELL EQUIPMENT CO., Inc.
FORT WORTH, TEXAS
Export: Lucey Export Corp., Woolworth Bldg., N. Y. C.

RECTORSEAL
THE POSITIVE LEAK PREVENTER

Southwest Texas AIME Officers

The newly-organized Southwest Texas Section of AIME recently elected permanent officers at the first business meeting attended by about 100 oil men from the Corpus Christi area. Formerly a part of the Gulf Coast Section, the new section was formed to offer better opportunities for AIME members and guests in Southwest Texas to participate in the Institute's activities. Shown in the photograph are the officers and directors of the new section, from left to right: Paul R. Turnbull, Humble Oil & Refining Company, chairman; E. C. Sargent, Puenticitas Oil Company, secretary-treasurer; L. B. Meaders, Halliburton Oil Well Cementing Company, director; R. C. Granberry, Jr., Humble Oil & Refining Company, director; J. L. Hoyt, Jr., Pan American Production Company, director; C. W. Kelley, Jr., Magnolia Petroleum Company, director; Charles B. Johnson, Jr., The Chicago Corporation, director; and Horton L. Pruett, consulting petroleum engineer, vice chairman.

Five More Oil Firms Announce Bonuses or Pay Adjustments

Five additional oil companies have announced wage adjustments or cost-of-living bonuses to their employes, totaling more than 20 firms now making such adjustments in wages or salaries.

An allowance of $50 was paid this month to employes of Plymouth Oil Company and its subsidiary, Big Lake Oil Company, who will also pay permanent employes with one year's service a Christmas bonus of one-half a month's salary or two weeks' wages to employes on monthly, or on daily and hourly basis. Permanent employes who have been with the company less than a year received one-quarter of a month's salary or one week's wages. This bonus was paid December 19.

Standard Oil Company (Ohio) has made a special four-month wage adjustment to all employes except those covered by union agreements which require negotiations. Each employe making less than $7200 per year received a check equal to 10 percent of his total compensation for the previous calendar month, minus income tax and social security.

Bareco Oil Company employes will receive a $25 per month bonus for November and December, 1946, and January, 1947, at the end of each month. These payments will be minus income taxes and social security.

Standard Oil Company of Kentucky paid on December 14 a week's salary to each regular employe, with a minimum of $30 and a maximum of $100 to any single employe. Officers and directors are excluded from the bonus.

Socony-Vacuum Oil Company, Inc., will pay a week's salary to its 36,000 employes.

The Carter Oil Company granted a week's pay a month, from October 15 to December 15. The Ohio Oil Company has announced $25 per month to employes from November through January, 1947. Pan American Petroleum Company will continue giving one week's pay, with a $100 maximum, for no specified period. Phillips Petroleum Company from November through February, 1947, will give an extra week's pay a month. Standard Oil Company (Indiana) will give a bonus equal to a week's pay, with a $100 maximum, from November 1 to January 15, 1947. Standard Oil Company (N. J.) has announced a week's pay for all employes up to supervisory level, excluding clerks and pipeliners, for an unspecified period.

Signal Oil Company has given a $75 bonus to all employes. It was not stated as a cost of living bonus or said to cover a specified period. Barnsdall Oil Company's bonus will be $25 per month for a period of November through December, 1946. The Superior Oil Company has granted $25 per month to salaried employes, $1 per day to hourly employes, for the period from October 16 to February 16, 1947.

Sunray Oil Corporation voted bonus checks amounting to five percent of each employe's base-pay earnings for the year. Total payment of approximately $90,000 was made to 750 employes.

Companies which have previously announced wage adjustments are Sinclair Oil Company, Stanolind Oil & Gas Company, Continental Oil Company, Humble Oil & Refining Company, Standard Oil Company of California, Gulf Oil Corporation and Gulf Refining Corporation, Shell Oil Company, and Sun Oil Company.

September Production Drop Reflected by Bureau Report

Largely as a result of drops of 25,000 barrels daily in Texas and 20,000 barrels in Oklahoma, domestic crude production for September declined 46,000 barrels a day below the August rate, to 4,790,000 barrels, according to the monthly report of the Bureau of Mines.

Daily average demand for domestic crude dropped 54,000 barrels to 4,831,000, but withdrawals at an average rate of 41,000 barrels daily were required from stocks. Total crude stocks, domestic and foreign, were reduced to 227,818,000 barrels September 30 from 229,223,000 barrels at the end of August.

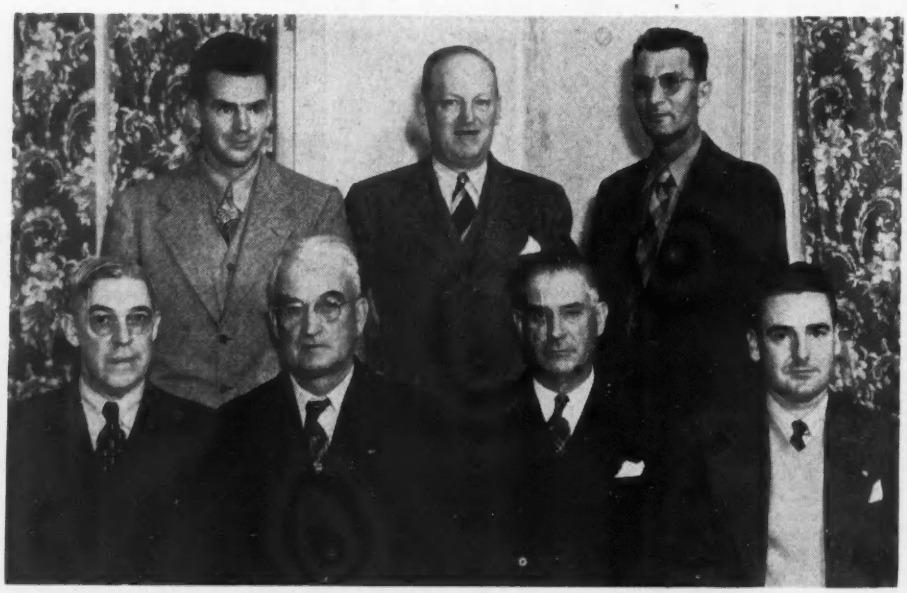
The Bureau reported crude runs to stills of 4,839,000 barrels daily, a drop of 17,000 barrels.

Oil well completions during the month were 1333, a drop of 92, but the number of active drilling rigs rose 273 to 4087.

Safety Record Rewarded

Twelve employes of The Texas Company's production department in the Bristow, Oklahoma, area, were honored at a dinner for ten years of work without loss of time by accident. Those receiving the commendation were Jerry Conners, production foreman; Jess Austin, Ed Bell, George Dotson, John Easley, Charlie Grimes, Ed Huston, Charles H. Kidd, Glover McClead, John Pennington, Henry W. Stephens, Dewey White, and Dave Anderson, a former member of the group who is now retired.

New Mexico Oil and Gas Executives



The executive committee of the New Mexico Oil & Gas Association, photographed at the association's recent annual meeting is shown above, left to right, as follows: Front row—Harry Leonard, treasurer; Emery Carper, vice president; Van S. Welch, president; Jack M. Campbell, executive secretary. Back row—John M. Kelly, J. N. Dunlavey and Ralph Hendrickson. Members of executive committee not in photograph: F. J. Danglade and Niven M. Baird.

Gasoline, Residual Fuel Output Up; Distillate Fuel Declines Slightly

Increased production of gasoline and residual fuel oil and a slight cutback in distillate fuel output characterized the week ending December 14. Daily average crude production was stepped up, while crude runs to stills were decreased from the previous week.

Demand for the burning oils, although eased some from last week, was heavy and resulted in large reductions from stocks. Gasoline demand continued to hold up well for this time of the year and only by the rise in production were stocks able to be increased.

Crude production averaged 4,717,000 barrels daily during the week, an increase of 22,000 a day over the previous week's rate, and 202,000 barrels or 4.5 percent over that of last year's comparable week.

Runs to refinery stills were reduced 35,000 barrels a day and averaged 4,685,000 daily during the week, which were 150,000 or 3.3 percent more than runs of the like week a year ago.

Refinable crude oil stocks totaled 225,419,000 barrels on December 7, the Bureau of Mines reported. This represented a decline of 2,174,000 barrels from the previous week's figure, but a 7,064,000-barrel or 3.2 percent increase over the 218,355,000 held December 8, last year.

The week's output of gasoline, including natural blended at the refineries, totaled 15,160,000 barrels, an increase of 315,000 over the previous week's production and 849,000 or 5.9 percent over that of the corresponding period of 1945. Stocks of finished and unfinished gasoline amounted to 88,678,000 barrels on December 14, to show an increase of 495,000 during the preceding seven days. These stocks were 1,156,000 barrels or 1.3 percent less than the 89,834,000 barrels held in storage a year before.

Distillate fuel production totaled 5,802,000 barrels during the week of December 14, a drop of 68,000 from the previous week, but 999,000 barrels or 20.8 percent more than last year's like week. Stocks of distillate were reduced 1,714,000 barrels during the week and ended at 62,147,000 barrels. These stocks were 21,159,000 barrels or 51.6 percent higher than the 40,988,000 held a year before.

Residual fuel output increased 129,000 barrels to 7,976,000, which was 324,000 barrels or 3.9 percent less than was made in the comparable week of 1945. Stocks of this heavy fuel oil decreased 1,113,000 barrels during the week and ended at 56,096,000 barrels. This inventory exceeded the 42,276,000 barrels that were in storage a year before by 13,820,000 barrels or 32.7 percent.

This report was taken from the weekly bulletin of the American Petroleum Institute.

Markets Hold Generally Firm; All Products in Good Demand

The industry's markets are generally firm in all areas, virtually all products as well as crude being in good demand at the prevailing prices.

While gasoline is now in the season of restricted consumption, there has not been any appreciable loosening up of supplies, and numerous refiners have reported that no material volumes of gasoline are going to storage. Some refiners are concerned, in fact, over the current low rates of gasoline stock accumulations, saying that increased additions to storage will be needed in coming weeks to have adequate inventories when spring arrives and brings larger demand.

Along the Atlantic Coast of the northern states, some suppliers have been experiencing shortages of gasoline, while the supply situation at Middle Atlantic Coast points was described as currently adequate but certainly not burdensome. In the Middle West the demand for gasoline continues comparatively heavy and some refiners are on the buying side.

In the Mid-Continent, too, gasoline was reported remarkably firm, as various refiners experienced sales as much as 35 percent above those at the comparable time last year. Gulf Coast refiners found demand strong, and from that district there was a sale of an export cargo of aviation gasoline for February lifting and destined for Europe.

Lubricating oils are in particularly strong demand, and some refiners have advanced their quotations in Western Pennsylvania, the Mid-Continent, and South Texas.

Fuel oils are becoming increasingly firm, as cold weather brings comparatively heavy demand and inroads into stocks. The market is strengthened also by the attitude of some refiners who are in no rush to liquidate stocks, feeling that prices may go higher as the winter progresses.

Trends of Operations and Changes in Stocks

Figures on crude stocks are from Bureau of Mines weekly reports; all others from American Petroleum Institute weekly reports, which are estimates on Bureau of Mines basis.

(All figures in thousands of barrels—add 000)

HIGHS AND LOWS OF RECENT YEARS

ITEM	Crude Oil Prod. Barrels Daily	Crude Oil Prod. Week Ended	Runs to Stills Barrels Daily	Runs to Stills Week Ended	Crude Stocks Barrels	Crude Stocks Week Ended	Gasoline Stocks Barrels	Gasoline Stocks Week Ended	Gasoil and Distillate Stocks Barrels	Gasoil and Distillate Stocks Week Ended	Residual Fuel Oil Stocks Barrels	Residual Fuel Oil Stocks Week Ended
Highs:												
1941	4,337	11-22	4,120	10-18	266,187	3-29	99,727	3-29	54,983	11-15	102,448	1- 4
1942	4,337	2- 7	3,961	1- 3	263,208	3-28	[1]109,281	3-14	47,861	11-14	95,857	1- 8
1943	4,436	11-13	4,331	12- 4	245,752	5-29	94,159	3-20	47,187	11-27	72,881	1- 2
1944	4,762	9-30	4,798	12-30	240,992	1- 1	89,162	4- 1	48,162	10-28	64,744	10- 7
1945	4,944	7-21	[1]5,140	8-18	227,554	10-13	99,012	3-24	45,341	11-17	56,074	1- 6
1946	[1]4,961	6-15	4,911	8-31	229,430	3- 2	105,233	2-16	[1]67,286	11- 9	61,636	11- 2
Lows:												
1939	[3]1,601	8-26	3,125	2-18	[2]229,127	10-12	71,152	10- 7	20,722	4-15	105,397	4- 3
1941	3,364	1-11	3,490	1-18	240,399	11-15	79,923	10- 4	28,382	4-12	90,914	7-13
1942	3,297	7- 4	3,393	5-23	231,896	12-12	75,934	12- 5	29,240	4-25	72,962	12-26
1943	3,821	1- 9	3,579	3-18	232,191	1- 9	68,182	10-16	30,732	4- 3	57,596	12-25
1944	4,357	1- 1	4,228	2-12	220,258	9- 9	76,302	1- 1	30,232	4-19	49,737	3-18
1945	3,621	10- 6	3,409	10-6	[4]211,813	8-25	70,791	10-13	26,483	3-17	38,548	5-26
1946	4,403	3- 9	4,498	1-12	218,193	1- 5	85,324	9-28	25,131	3- 9	37,289	4- 6

TRENDS OF 1946

Trends in Week Ended	Crude Oil Production Daily	Crude Oil Runs to Stills Daily	Crude Oil Stocks Week End	Gasoline Production Weekly	Gasoline Stocks Week End	Gasoil and Distillate Production Weekly	Gasoil and Distillate Stocks Week End	Residual Fuel Production Weekly	Residual Fuel Stocks Week End
1946:									
January 5	4,548	4,651	218,193	14,488	98,494	5,293	35,199	8,867	42,371
January 26	4,626	4,553	220,544	13,622	101,737	5,720	29,498	8,411	39,722
February 23	4,714	4,595	226,699	13,175	104,709	5,728	25,398	7,913	39,290
March 30	4,425	4,684	224,994	13,896	104,715	5,337	28,240	8,738	37,746
April 27	4,672	4,685	224,443	14,228	99,631	5,568	30,466	9,204	39,404
May 25	4,759	4,857	222,214	14,312	95,769	5,463	32,973	8,908	43,368
June 29	4,957	4,854	223,883	14,500	92,333	5,325	37,762	8,828	46,447
July 27	4,926	4,896	223,756	14,535	88,626	5,817	44,316	8,217	49,517
August 31	4,833	4,911	227,132	15,014	87,217	5,630	53,134	8,539	53,173
September 28	4,778	4,829	223,043	14,675	85,324	5,632	59,827	8,172	57,657
October 26	4,730	4,758	221,184	14,863	86,423	5,710	65,499	7,728	60,872
November 30	4,795	4,707	227,693	15,145	88,371	5,258	66,062	7,672	58,647
December 7	4,695	4,720	225,419	14,845	88,183	5,870	63,861	7,847	57,209
Dec. 14, 1946	4,717	4,685	.....	15,160	88,678	5,802	62,147	7,976	56,096
Dec. 15, 1945	4,515	4,535	[5]218,355	14,311	89,834	4,803	40,988	8,300	42,276
Change:									
In Week	+22	—35	—2,274	+315	+495	—68	—1,714	+129	—1,113
In Year	+202	+150	+7,064	+849	—1,156	+999	+21,159	—324	+13,820
In Year	+4.5%	+3.3%	+3.2%	+5.9%	—1.3%	+20.8%	+51.6%	—3.9%	+32.7%

[1] All time peak. [2] Lowest between January, 1922 and July 1, 1944. [3] Lowest since October, 1922, due to shutdown of six Mid-Continent states. [4] Lowest since December, 1921. [5] Stocks, December 8, 1945.

☆ Oklahoma

Dewey County Wildcat Quits; Abandoned Well Blows In

Dewey County wildcat abandoned after year of drilling and testing; abandoned well blows in for 7 million cubic feet of gas; Gulf completes Antioch oiler; gasser brought in east of Okemah; big price paid for School Land leases in Garvin County; gas pocket slows operations at Kingfisher wildcat; Cotton County wildcat may open oil pool.

Dewey County: One of Oklahoma's most closely watched wildcats, which has cost its supporters an estimated $300,000 after a year of drilling and testing, is being plugged. The well, Oklahoma Natural Gas Company et al's Oakwood Unit 1, NW NW NW 6-17n-14w, is 3 miles north of Oakwood townsite. Spudded in January, the well went to 12,610 feet, through the Second Wilcox sand. After this depth was reached with no commercial oil shows, the well was plugged back for tests further up the hole. The wildcat has been tested in the Layton sand zone for the past several weeks, with no results. A zone from 7910-8010 feet was perforated twice and tested 50 barrels of 39-gravity oil in 24 hours, but this flow was soon depleted.

Seminole County: An abandoned oil well in the Seminole City field blew in for an estimated 7 million cubic feet of gas while crew was loosening pipe at 2338 feet in an effort to retrieve casing. The well, formerly Sinclair Prairie Oil Company's Franks 1, NW NW NE 35-9n-6e, just east of Seminole Townsite, had been taken over by the M. M. Tripplehorn Company of Tulsa. The test was abandoned by Sinclair 4 years ago after its oil flow was depleted. The well was drilled by the late Thomas B. Slick in 1926 and was completed in November of that year for an initial flow of 300 barrels of oil per hour, or 7200 barrels per day. The Franks, after declining through the years, was marked a 100 per cent dry hole in 1942, but only after it had produced an estimated 250,000 barrels of oil. It will now be completed as a gasser.

Antioch Area: Gulf Oil Corporation has completed one of the best oilers to date in the Southwest Antioch pool of Garvin County. The Frank Field 1, NW NE SW 20-3n-2w, on the north end of the field, has been estimated good for approximately 2592 barrels of oil, with no water, daily from the Gibson sand, topped at 6315 feet. This estimate was based on the initial flow of 88 barrels of oil in 1 hour through ¾-inch choke, and 108 barrels in 1 hour through 2-inch open tubing. Total depth is 6545 feet, plugged back to 6490 feet.

Okfuskee County: W. C. McBride, Inc., has brought in a gasser east of Okemah townsite, in the Northwest Clearview District. The Sharp 1, NE NE SE 15-11n-10e, is making an estimated 2 million cubic feet of gas a day from the Hunton lime at 3740-810 feet. Total depth is 3810 feet, with the pay zone topped at 3724 feet.

Garvin County: Interest in the county, which recently was stimulated to a high degree by good oil showings in Max Pray and R. L. Bauman's Martin (Rose) 1, CNE NE 1-4n-4w, was emphasized at a state school land lease sale. Phillips Petroleum Company, Bartlesville, bid $93,750 for an oil and gas lease on 60 acres near the Pray and Bauman lease, and $62,500 for a lease on 40 acres, comprising the west half of SE NW, NE SE NW and SE NE NW 7-4n-3w; and $31,250 for the 20 acres comprising the west half, NW NW 8-4n-3w. The Martin 1, discovery well in the Bromide zone, flowed 238 barrels of oil in 12 hours through ⅜-inch choke on casing.

Kingfisher County: The Atlantic Refining Company's Vilhauer 1, SW NE NW 22-18n-9w, near Royal in the northwestern portion of the county and in the Anadarko Basin, was held up with drilling operations for approximately a week due to a gas pocket in the Pennsylvanian formation. While the volume of gas was not large (estimated at between 1½ million and 4 million cubic feet), it possessed considerable rock pressure which halted drilling. The gas forced crew to thicken drilling mud to prevent a possible blow out. The wildcat is a test for oil.

Cotton County: Another oil pool is promised in the state's most active area Roy L. Fisher et al's Bates 1, NW NW SE 17-3s-11w, about a mile southwest of the Essaquanahdale pool, is testing an estimated 50 to 100 barrels of oil daily from sand, from 1563-87 feet, total depth. Location is on a farmout from Cities Service Oil Company and Kingwood Oil Company, which jointly own the southeast quarter of Sec. 17.

Wells Comleted in United States in Week Ended December 14, 1946

Data preliminary and subject to revision. Revised and more complete data on all completions and exploration shown in monthly summaries published in last issue of each month.

State or District	FIELD COMPLETIONS: New Wells Oil	Dist.	Gas	*Input	Dry	Total	Old Wells Deepened	EXPLORATORY COMPLETIONS Oil	Dist.	Gas	Dry	Total	ALL COMPLETIONS This Week	Last Week	This Week 1945
Arkansas	4					4		1			1	2	6	4	11
California	25				3	28	2				6	6	36	40	27
Colorado	1					1					2	2	3	10	3
Illinois	21			1	16	38	1			1	5	6	45	33	60
Indiana	8				3	11					3	3	14	11	22
Kansas	19		6		11	36		1			6	7	43	53	44
Kentucky	6				3	9		1			1	2	11	12	43
Louisiana	17		2		10	29		2			3	5	34	30	25
N. Louisiana	10		2		6	18		1			1	2	20	14	16
S. Louisiana	7				4	11		1			2	3	14	16	9
Michigan	7		4		1	12					7	7	19	7	14
Mississippi	3		2			5		1				1	6	12	3
Montana	2				1	3							3	2	3
New Mexico	5		1		1	7							7	9	12
New York	15		10			25							25	23	25
Ohio	6		8		9	23		1		2	2	5	28	26	6
Oklahoma	21		3		19	43	2			1	16	17	62	69	44
Pennsylvania	27		5	15	3	50							50	51	52
South Dakota														1	
Texas	89	1	7	2	23	122	2	4	2	2	32	40	164	136	174
E. Tex. Bor. Co.'s			1			1							1	5	3
Rest of E. Tex.	5				3	8							8	10	12
North Texas	28		1	1	9	39	1	1			11	12	52	29	55
W. Central Tex.	4		1		2	7					3	3	10	10	22
West Texas	25				3	28	1	1			3	4	33	34	25
Texas Panhandle	6		3		1	10					1	1	11	6	6
G. Coast, Upper.	6	1			2	9			1		3	4	13	10	22
G. Coast, Lower.	13		1	1	3	18		2	1		4	7	25	20	15
Southwest Texas	2					2				2	6	8	10	6	13
S. Central Tex.											1	1	1	6	1
West Virginia	2		14		1	17							17	15	20
Wyoming	2					2							2	4	4
Total U.S.	280	1	62	18	104	465	7	11	2	6	84	103	575	548	592

* Includes salt water disposal wells.

☆ Kansas

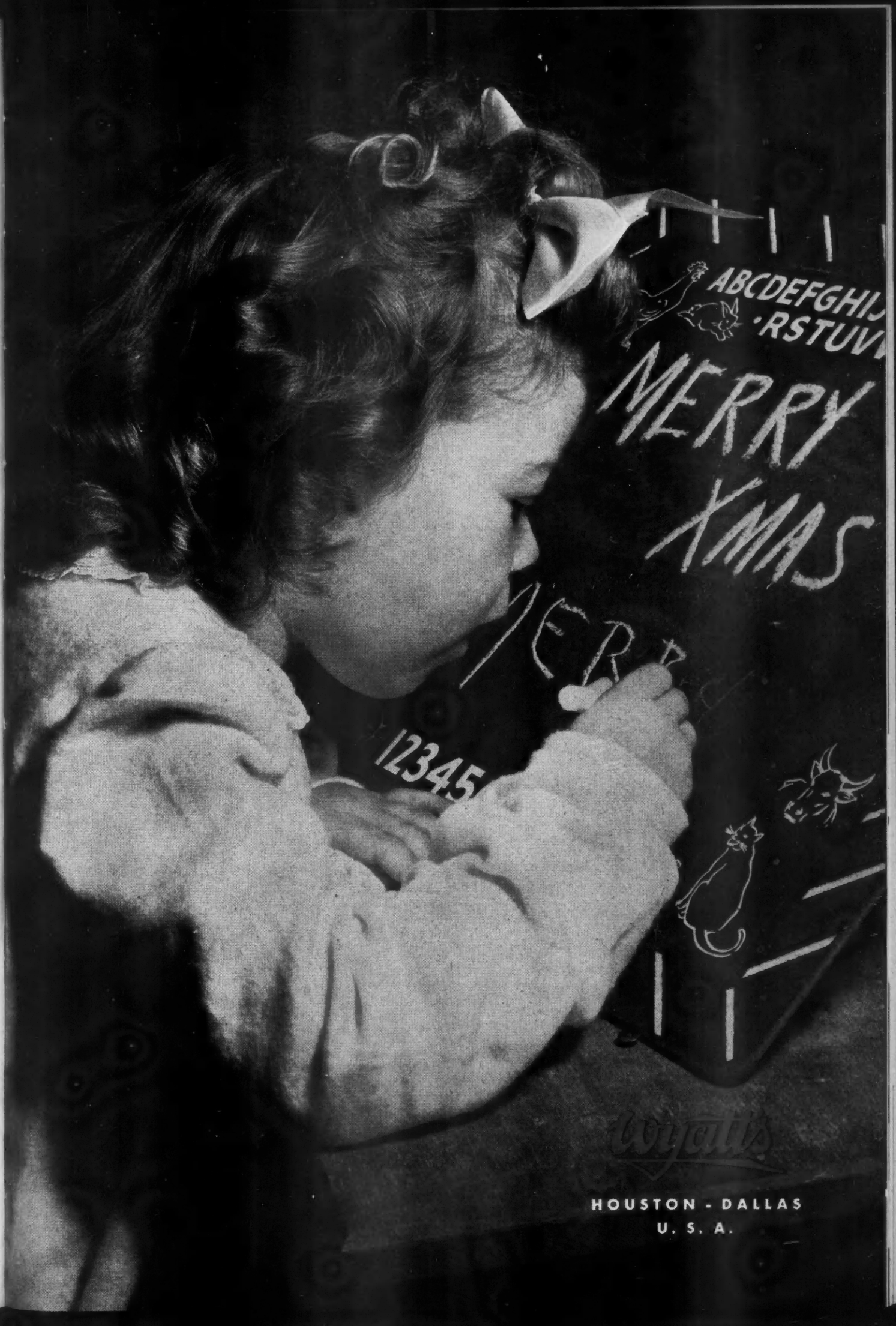
Ellis County May Get Pool; Lehigh Pool Given New Pay

Skelly may open oil pool in Ellis County; Ellsworth County wildcat looms as pool opener; Apco well completed as new zone opener in Lehigh pool; Stanolind's Harvey County wildcat shut down for orders.

Ellis County: Skelly Oil Company apparently will open a new oil pool about 1¼ miles northeast of the Solomon pool with Allen 1, SE SE SW 22-11s-19w. The well logged good porosity and saturation, with heavy free oil, in the Arbuckle lime from 3639-45 feet.

Ellsworth County: Bennett & Roberts' Dobrinski 1, NW NW NE 16-17s-9w, logged a good show of oil at 2966-3026 feet in the Lansing lime. Drilling was halted at 3300 feet in conglomerate to test shows through perforations. The test is between the Stoltenberg and the Lorraine pools.

Marion County: Anderson-Prichard Oil Corporation's Weyland 1, SE NE SW 27-19s-1e, has been given a state potential of 239 barrels of oil daily from the Simpson sand sector. The well was completed from that zone, thus opening a new producing horizon for the Lehigh



Wyatt's

HOUSTON - DALLAS
U. S. A.

pool, which produces from the Mississippi chat. The well on previous tests showed oil and gas from three zones: Simpson sand, Viola lime, and Mississippi chat.

Harvey County: Stanolind Oil & Gas Company's Brandenberger 1, wildcat in SW NE NW 12-24s-3w, 2 miles north of the Potwin pool, was shut down for orders at 4018 feet after oil, with a sulphurous odor, was found in a core cut at 4004-14 feet in the Arbuckle lime. This formation was topped at 3984 feet. Considerable oil and salt water were recovered on a drill-stem test at 3893-910 feet in the Viola lime, topped at 3873 feet.

☆ New Mexico

Roosevelt Wildcat Deepening After Developing Gas Flow

Roosevelt County wildcat deepening after developing small flow of gas above water in San Andres; Yeso pay extension given Drinkard and Paddock fields, Lea County; deep prospecting assuming large proportions throughout the state after extensive geophysical surveys.

Roosevelt County: Continental Oil Company and Cooperative Refineries Association's Alston-Federal Unit 1, C SE SE 20-7s-35e, 2¼ miles northwest of a 7957-foot granite failure, resumed drilling to fulfill 6000-foot depth contract after testing sulphur water at 4380 feet. This wildcat entered the San Andres at 3505 feet, with elevation of 4236 feet, correlating 27 feet high to the deep failure. Nominal oil staining and porosity showed in 5 zones between 4113 and 4278 feet. A production test at 4290 feet yielded dry gas at the rate of 107,000 cubic feet daily. This wildcat is 35 miles northwest of the Landon pool, Cochran County, Texas, nearest production. The show of gas will encourage further explorations on the 7800-acre unit regardless of the outcome of deepening the current test.

Lea County: Tide Water Associated Oil Company's State 1-Q, C SE SW 36-21s-37e, ¼ mile east of Yeso production on the north edge of the Paddock 5100-foot Glorietta producing area, flowed 108 barrels of oil on 22-hour gauge through ⅜-inch choke after acidizing perforations at 6470-90 and 6500-28 feet. It is about 60 feet low to the west offset.

Cities Service Oil Company's State 1-P, C SE NW 32-22s-38e, south outpost for the original Drinkard field, flowed at the rate of 20 barrels of oil hourly when tester was used on the Yeso at 6855-6983 feet. Pipe has been set for completion.

Hobbs Field: Sun Oil Company's McKinley 1-B, deepened San Andres pumper on the northeast edge of the structure, was preparing to shoot with nitro at 7542-7658 feet in Basal Permian, and probably the Wolfcamp beds, having swabbed 28 barrels of fluid, including 5 percent basic sediment and water, on 19-hour test after acidizing.

San Juan County: Byrd & Frost, Inc., and P. B. English's Hargrove-Federal 1, C NW NW 4-27n-10w, currently the most promising deep prospect under way in the northwest sector of the state, was drilling at 5942 feet with the Dakota as its next objective. Several prospective producing zones have been logged by this wildcat.

☆ West Texas

New Permian Zones Proved in Keystone, Murchison Fields

New Permian oil zones proved in Keystone and Murchison fields; Ellenburger discovery in Andrews County has large potential; Crockett County wildcat acreage commands big price at University sale.

Winkler County: Gulf Oil Corporation's Keystone 99-E, C SE NE PSL 10, Block B-3, twin location to a Glorietta (Holt) lime producer at 4700-50 feet and offsetting Ellenburger production in the Keystone field, blew out with a prolific flow at 5041 feet after testing through 9⅝-inch pipe at 5031 feet. Additional pay was logged in deepening to 5051 feet, where the well gauged 1502 barrels of 41.7-gravity oil, with gas-oil ratio of 839/1, through 1-inch choke on testing tool in 14 hours and 35 minutes. It will be deepened to the Ellenburger as originally planned. Production is from top section of the Clear Fork, which has indicated promising oil flow and also high-pressure gas in drilling Ellenburger wells in this sector of the field.

Ector County: American Republics Corporation's T.P. Land Trust 1, ⅝ mile southeast of the Murchison pool pumping discovery in the Devonian, and a failure in this zone and the Ellenburger, headed oil from Wolfcamp (Basal Permian) perforations at 7798-7815 feet to establish a new pay for the area. The well headed 10 barrels of fluid hourly while cleaning itself following treatment with 500 gallons of mud acid, then flowed 14 barrels of 38.8-gravity oil in 2 hours. Treatment with 1500 gallons of acid was under way. All completions in the district from the Wolfcamp have been a compromise against recording a failure, as the anticipated yield per acre is subnormal for the depths involved.

Gulf's Goldsmith 421-E, near apex of the San Andres production in the Goldsmith field, was drilling lime at 6810 feet, having failed to show for a producer in the Glorietta or Clear Fork. The Glorietta was entered at 4900 feet, or 136 feet high to the Clear Fork oil discovery on the north edge of the structure. Gulf and E. E. Fogelson's University 1-A, Jordan field, was drilling lime and chert at 7390 feet in barren Devonian, topped at 6970 feet, or 219 feet high to a 9357-foot Ellenburger failure 4½ miles north by west.

Andrews County: Humble Oil & Refining Company's Sims 2, C NE NE PSL 25, Block A-39, 3⅛ miles northwest of the Nelson 1-well field and on the same producing contour, flowed 228 barrels of 42-gravity oil, with gas-oil ratio 357/1, on 3-hour gauge through 2-inch tubing after using 2000 gallons of acid. Production is from Ellenburger perforations at 10,467-531 feet. This discovery, or extension, showed promise of oil production in the Wichita-Albany, or Basal Permian at 7208-7375 feet, which is productive in the Drinkard field, New Mexico, 2½ miles southwest.

Shell Oil Company's McCrea 1, ¼ mile east of its Nelson field discovery, was drilling at 9530 feet, correlating 120 feet low on the Fusselman, topped at 9090 feet. Humble's Pinson 1, ½ mile south of the Nelson discovery, was drilling shale at 10,550 feet, correlating 240 feet low on the Simpson.

University Sale: Geophysical prospects centering upon University Lands in Crockett County resulted in unusually high prices being paid at the December 14 lease auction. Sinclair Prairie Oil Company set a new price record for a drilling block in paying $910,000 cash, plus obligation to drill 9500-foot Ellenburger test for 2492½ acres, or $365.95 per acre. This acreage is in the southeast corner of Block 46 and southwest corner of Block 45. The company paid $164,000 cash for 5-year lease on N½ Sect. 19, Block 42, being 2½ miles southwest of Stanolind Oil & Gas Company's University 1-GG, which was temporarily abandoned but not plugged prior to the sale. The latter will be perforated opposite indicated commercial gas-distillate flow in the top of the Ellenburger. The Texas Company assumed 9500-foot Ellenburger drilling obligation in paying $240,000 cash for 2948 acres in Block 40, centering upon Crockett-Irion County, then strengthened its position by paying $423,000 for 1087 acres immediately north, including $210,000 cash for N½ Sect. 14, Block 40.

Coke County: Sun Oil Company's Jameson 1, recent Crinoidal lime (Pennsylvanian) discovery, flowed 168 barrels of 46-gravity oil, with gas-oil ratio of 1684/1, natural through ¼-inch choke from open hole at 6225-45 feet on official gauge. The company controls the area, which may embrace between 2000 and 3000 productive acres, trending north-south on a reef-type structure. Sun's Fred Jameson 1, south offset, was drilling at 1280 feet, and will explore the Ellenburger regardless of the pay thickness of the Crinoidal. The output of the discovery is being marketed by tank cars from the rack at Bronte.

Deep Failures: Gulf's McKnight 8, Crane County wildcat and 1⅝ miles north of the McKnight pool, tested water in Ellenburger at 8740-8845 feet. It is the first to log Devonian, topped at 6687 feet, in the general area. In Crockett County, T. W. and J. M. Loffland, Jr., et al's V. B. Cox 1 quit in dry dolomite at 10,939 feet, having entered the Ellenburger at 10,260 feet. Oil Well Drilling Company's Tharp 1, Parmer County and near the junction of the West Texas and Panhandle districts, quit in lime and shale at 7511 feet. Streaks of oil stain and porosity were logged at intervals between 4600 and 6600 feet, while a nominal show of gas appeared in the granite-wash, topped at 7275 feet.

Kent County: Humble's Blair 1, 1⅝ miles southwest of the Polar 2-well pool, was drilling shale at 6260 feet, correlating 72 feet low on the San Andres, topped at 1595 feet.

☆ North Texas

Archer County Burns-Benson Area Has Major Extension

Major extension given Burns-Benson deep lime area, Archer County; 2 wildcats in Clay County will make commercial pumpers; second well in Montague County field correlates high; Harrold field has new oil pay.

Archer County: H. W. Snowden Oil & Gas Company's Turbeville 1, J. B. Hinds Survey A-184, extended the Burns-Benson field a mile northeast in

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flowing 225 barrels of oil initial through ¼-inch choke from Bend at 4572-4672 feet. The firm's Turbeville 2, south offset, logged promising oil show in Strawn at 3550-61 feet. The latter zone is not productive in the field proper, although the 4300-foot Basal Strawn has accounted for 2 pumpers. First deep production was opened in May, 1945, by L. T. Burns. The area now rates among the largest in the county for undrilled proved locations, and will experience considerable development next year.

Clay County: R. C. Lipscomb et al's Hapgood 1-A, block 78, Marion County school lands and 1½ miles southeast of the Hapgood pool, flowed 25 barrels of oil hourly for 3 hours then quit. This production is from Strawn sand at 4975-5002 feet. It will install pumping unit. Rig was skidded a location west.

Continental Oil Company and Edge Oil Company's Scott 1, which has been showing for a small Ellenburger discovery in the Buffalo Springs area, swabbed 68 barrels of new oil in 15 hours after reacidizing with 12,000 gallons in open hole at 6485-6515 feet. A marginal pumper is assured.

Montague County: Continental's Hardison 1, N. S. Ussery Survey and west offset to its prolific discovery for the Lewis-Steward pool, was drilling conglomerate at 6475 feet to determine the thickness of the section before setting pipe. Bend lime was entered at 6155 feet, or 7 feet high, and the well flowed through testing tool from conglomerate at 6351-62 feet.

Eason Oil Company's Yarbrough 1, F. J. Bellows Survey, a mile south of nearest active production in the Bowers field, pumped 82 barrels of 39.6-gravity oil, plus 2 percent water, on 6-hour test of Strawn at 4054-68 and 4084-4101 feet. It is ⅝ mile sonuthwest of a depleted producer that was completed from the same zones.

Wilbarger County: Big Six Oil Company's Schlaffke-Morris 1-A, SE SE H&TC Railway 3, Block 14, originally completed as the Mississippi-pay discovery for the Harrold field, established first Strawn production for the area in flowing 64½ barrels of oil on 3-hour gauge through ¾-inch choke from perforations at 4230-36 feet. The structure has not been explored sufficiently to this level to determine if the Strawn pay embraces considerable area.

The Texas Company's Hauser 1, Wm. Alston Survey and 3 miles northwest of the Harrold multi-pay area, missed the Canyon pays, and was drilling shale at 5410 feet.

National Associated Petroleum Company's Lewis 1, SE NE H&TC Railway 10, Block 9, was abandoned without shows at 5005 feet.

Foard County: Stanolind Oil & Gas Company's Halsell 1, John Shearer Survey and near 3 deep failures that showed oil, was drilling at 5595 feet in Mississippian, topped at 5550 feet. This wildcat yielded oil- and gas-cut mud when tester was used at 4821-42 feet in the K-M-A (Strawn) lime, topped at 4617 feet with elevation of 1416 feet.

Indian Leases Offered

Sealed bids for oil and gas mining leases on restricted lands of members of the Five Civilized Tribes will be received in the office of Superintendent W. O. Roberts until 10 a.m. January 14. A total of 127 leases in 19 counties is being offered.

☆ East Texas

Gas Tapped in Cotton Valley By Projected Smackover Test

Smackover prospect in Freestone County has high-pressure gas in Cotton Valley; Cherokee County wildcat has oil show in Travis Peak; official gauge given Smith County discovery.

Freestone County: The Texas Company's White 1, Wm. King Survey and 500 feet west of a Travis Peak gasser in the Fairfield field, was drilling lime at 12,879 feet in Buckner, topped at 11,943 feet. This projected Smackover test tried to blow out as a gasser while drilling at 12,713 feet, and required 15-pound mud to equalize the pressure. The gas is believed to be from a porous zone at 11,286-332 feet in Cotton Valley.

Cherokee County: Standard Oil Company of Texas' New Birmingham 1, G. E. Looney Survey and an indicated gas-distillate discovery for the Bacon and James limes, enhanced its outlook for production in logging nominal gas show at 9765-71 feet and oil show at 9822-32 feet in Travis Peak, topped at 9508 feet. Drilling was underway at 9980 feet in dry sand, and will continue to the water zone before setting pipe on bottom for production tests.

Smith County: Delta Drilling Company's Boynton-Magnolia 1, J. J. Smith Survey and 2 miles east by north of the Mount Sylvan field's Paluxy discovery, recorded a potential of 283 barrels of 33.3-gravity oil, with gas-oil ratio of 158/1, on natural test through ¼-inch choke from perforations at 7512-28 feet. This discovery, or extension, logged only 11 feet of effective Paluxy sand pay, topped at 7516 feet with elevation of 528 feet. Nearby leases involve small tracts, thereby indicating considerable development if the producing area can be materially expanded.

Wood County: Shell Oil Company's Goldsmith 12, previously listed as a prospective Rodessa discovery for the Quitman field, was drilling shale and lime at 7990 feet, with 9-inch protection pipe cemented at 7924 feet. This initial deep test for the 2-pay field headed gas and distillate at 7820-73 feet, and cored oil-stained lime at 7905-30 feet. The latter was not tested. It is contracted to drill to the Smackover.

Humble Oil & Refining Company's McKnight 1, northeast edge of the Hawkins field and a Smackover project, was drilling hard sand with streaks of shale at 10,280 feet in Travis Peak, topped at 9555 feet. No shows have been recorded since passing up gas-distillate in the 8900-foot Rodessa.

Haynes B. Ownby et al's Harry-Sun 1, Jonathan Swift Survey and 3½ miles southwest of Quitman Townsite, was drilling Barren Woodbine at 5485 feet, having entered this zone at 5290 feet.

☆ Southwest Texas

Potential Run on Discovery Southeast of Kelsey Field

Potential run on discovery southeast of Kelsey field; Sun field production extended south; gas well extends La Reforma production northwest; East Longhorn field extended 1050 feet northeast.

Starr County: Daubert & Achning's Villareal 1, new field opener 1¼ miles southeast of Kelsey field, flowed 152 barrels of 41-gravity oil daily on potentilal gauge. Flow was through ⅛-inch choke with tubing pressure 900 pounds, casing pressure 1220 pounds, and gas-oil ratio 385/1. Total depth is 5988 feet with 5½-inch casing set on bottom and perforated for completion at 5961½-67 feet. The well is in the Santa Cruz Grant.

Sun Oil Company's Hall 1-A has extended Sun field production ⅔ mile south. On completion the well flowed 26 barrels of 44.4-gravity oil daily through 3/32-inch choke and using gas-lift.

Production at La Reforma field has been extended approximately a mile northwest by Sun's C. V. de Lopez et al 1-A. The well was shut in after flowing on potential 1,160,000 cubic feet of gas daily from perforations at 6010-20 feet. Total depth is 6138 feet with 5½-inch casing set on bottom. Several drill-stem tests were made in the hole, all recovering gas.

Duval County: Completed as a 1050-foot northeast extension of East Longhorn field is Lewis Lawlor's A. G. Villareal 1. On potential the well flowed 84 barrels of oil daily through ⅛-inch choke with tubing pressure 675 pounds and casing pressure 1500 pounds. Gas-oil ratio was 782/1. Total depth is 5215 feet with 5½-inch casing set on bottom and perforated for completion at 5148-53 feet. Nearest producer is Hiawatha Oil & Gas Company's Herberger 13.

Consumers Co-Operative Buys Bridgeport Controlling Stock

An offer of the Consumers Co-Operative Refinery Association, Kansas City, Mo., to purchase stock from the "management" group of stockholders for $10.10 per share, has been accepted by the Bridgeport Oil Company, Inc., officials of the latter company reported.

Lester L. Morris, secretary for Bridgeport, said that between 70,000 and 80,000 of the 264,000 shares of common stock outstanding are represented by the selling group.

Co-Operative has agreed to pay the same price for any additional stock received within 30 days from the date it takes control.

Bridgeport has production in Oklahoma and Kansas, but principally in Kansas, from which crude runs have averaged 88,000 barrels a month.

Contractors Visit Mills, Suggest Close Inspection

Greater attention to drill pipe inspection at the mill was asked by J. E. Warren, president of the American Association of Oilwell Drilling Contractors, following a recent visit by a group of association officials to large pipe mills in the East. Contractors in the party with Warren thought that a small additional expenditure for such inspection might result in elimination of some field operating problems.

Representatives of the various mills visited pledged their support of any reasonable inspection method that would give desired results, but stated that methods now used appeared fairly satisfactory.

Mills represented at the conference were Jones & Laughlin Steel Corporation, National Tube Company, Spang-Chalfant, Pittsburgh Steel Company and Youngstown Sheet & Tube Company.

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☆ South Central Texas

Producer Finaled at Wiegang Field in Atascosa County

New producer finaled at Wiegang; east extension at Charlotte completed; Bexar County test drilling below 4360 feet; 2 drill-stem tests made in Rock Springs wildcat.

Atascosa County: New producer for Wiegang field (formerly named Fashing), is H. R. Smith and Skinner and Eddy's Schumann 3, just completed for a potential of 110 barrels of 24.5-gravity oil daily through ⅛-inch choke. Tubing pressure was 50 pounds, casing pressure 1450 pounds, and gas-oil ratio 1200/1. Total depth is 3804 feet with 7-inch casing set on bottom and perforated for completion at 3796-3801 feet. This is the seventh producer in this new field, discovered in July by the same operators' Wiegang 1.

On Jourdanton field Humble Oil & Refining Company has completed Henry Schorsch 3 as an east extension. Located 1697 feet east of the Schorsch 2, the No. 3 well flowed 84 barrels of oil daily through 7/64-inch choke. Completion is from open hole, total depth being 7373 feet with 5½-inch casing set to 7369 feet. Production is from the Edwards lime.

Bexar County: Ralph Fair et al's Pauline Lyre 1, wildcat in Maria Bustilles Survey 29, is drilling below 4360 feet. A drill-stem test at 2920-27 feet recovered salt water. Projected total depth is 6000 feet.

Edwards County: Shell Oil Company's J. H. Brown 1, wildcat 5 miles northeast of Rock Springs, is below 5075 feet in dolomite after making 2 drill-stem tests. The first test at 4566-4743 feet recovered 180 feet of mud and developed a slight blow.

Pampa Plant Closed Until Conditions Change

The Danciger Oil & Refining Company's Pampa, Texas, refinery, with a capacity of 7500 barrels of crude daily, has been shut down, and more than half of the employes—those not necessary for the plant's maintenance—have been released.

Dan Danciger, president, said that "unless general conditions in the refinery industry change, it will stay down."

The company is storing most of its crude oil that normally would be run through the plant.

Southwestern Area API Production Groups Named

Functional committees have been elected for the spring meeting of the Southwestern District, API Division of Production, to be held in Fort Worth, March 27-28, 1947, R. B. Kelly, chairman of the general arrangements committee, has announced.

Chairmen include B. J. Dowd, Union Producing Company, Shreveport, program committee; Robert A. Seale, Globe Supply Company, Shreveport, registration committee; Paul Randels, Black, Sivalls & Bryson, Inc., Fort Worth, meeting room arrangements committee; Ken W. Davis, Mid-Continent Supply Company, Fort Worth, entertainment, and LeRoy Menzing, Star Telegram, Fort Worth, publicity committee.

Maryland Wildcat Abandoned In Cretaceous at 7710 Feet

Standard Oil Company of New Jersey has abandoned at 7710 feet its Maryland Esso 1, wildcat on the Atlantic Seaboard. Located about 250 yards from the beach and 5½ miles north of Ocean City, Md., the well spudded October 15, and was abandoned December 13 after drilling and failing to find shows of oil or gas. At the bottom of the hole it was in the Lower Cretaceous formations. Electric logging survey was run to bottom and a series of 15 side-wall cores were taken, none of which showed oil or gas. This test is the second in a series of Atlantic Seaboard tests planned by the company, the first having been a dry hole drilled at Cape Hatteras.

This well was drilled by Noble Drilling Company as contractors, with a portable rig using jackknife derrick.

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☆ Lower Texas Coast

Brooks County's East Alta Mesa Field Has New Pay Zone

New pay zone discovered at East Alta Mesa; mile northeast extension at Mariposa likely; 4000-foot outpost at Boyce being completed as gas-condensate well; second producer for Schwartz field being completed.

Brooks County: Standard Oil Company of Texas' B. G. De Garcia 6 has discovered a new pay zone at East Alta Mesa field. On drill-stem test of perforations at 6246-58 and 6262-68 feet the well flowed 52 barrels of condensate and 2,310,000 cubic feet of gas daily through ¼-inch chokes top and bottom, tubing pressure being 2100 pounds. Total depth is 6740 feet with 7-inch casing set to 6451 feet. This well is 1400 feet from the west line and 12,500 feet from the south line of the La Encantada Grant, and 1038 feet northwest of the de Garcia 4 discovery. The two other producers in the field produce from levels at 7300-7400 feet.

Humble Oil & Refining Company's D. J. Sullivan 3-C, a mile northeast extension test at Mariposa field, recovered 95 feet of condensate on a drill-stem test at 8251-59 feet. Hole was drilled below 8287 feet following this test. This outpost is 5560 feet northeast of the Sullivan 4-C gas well and 1980 feet east and 1980 feet north of the northwest corner of J. F. Dawson Survey 154.

Goliad County: Sun Oil Company's Emil Els 1, outpost at Boyce field 4000 feet northwest of the nearest producer, is being completed as a gas-condensate well in the Slick sand at around 7500-45 feet. A drill-stem test at 7627-48 feet recovered 1159 feet of water cushion in 30 minutes with no working pressure. A second drill-stem test at 7687-7701 feet recovered 780 feet of salt water and 420 feet of oil- and gas-cut mud with a small amount of free oil and 1 pound working pressure. These two drill-stem tests were in the regular 7600-foot oil pay sand of the field.

Live Oak County: Second producer for the new Schwartz field is Henshaw Brothers & E. H. Smith's Lopez 1, 700 feet southwest of the same operators' Schwartz 1 discovery. On drill-stem test of the 4000-foot discovery pay, 475 feet of oil was recovered in 15 minutes with 42 pounds working pressure, ¼-inch choke used top and bottom. A second test after coring 5 feet more recovered 2600 feet of oil in 15 minutes.

Barnsdall Official Discusses Value of Water-Injection

The injection of water into oil-producing horizons to increase production and recovery has proved profitable in a number of fields in the Southwest, William L. Horner, manager of the Secondary Recovery Department, Barnsdall Oil Company, Tulsa, told the Oil & Gas Division of the Oklahoma City Chamber of Commerce.

He listed a number of fields where water-injection is being used at the present time, but gave detailed information on the injection project in the Midway field of Southern Arkansas, where his company owns 62-percent interest.

At the Midway field engineers con-

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ceived the idea of injecting water while the field still was in its primary producing stage. Four injection wells are being used, and 9000 barrels of fresh water and 1000 barrels of salt water are being put back into the reservoir daily. As a result, oil production is averaging approximately 7400 barrels per day.

The field has yielded about 11 million barrels of oil. Without water injection its estimated total recovery would be about 28 million barrels. With the water injection program, recovery will be about 67 million barrels.

Colorado Lands Offered

Sealed bids will be received at the Consolidated Ute Indian Agency, Ignacio, Colo., until January 2, 1947, for oil and gas leases on 680 acres of the Southern Ute Tribal Indian Lands in Archuleta County, Colorado.

☆ Upper Texas Coast

Esperson Dome West Flank Test Has Condensate Flow

Esperson dome west flank test flows gas-condensate; estimated gauge of new discovery in Baileys Prairie area made; Tide Haven wildcat showing as discovery; oil sand cored in wildcat near East Bay City; second well at North Port Neches being completed; new sand discovered at Orange.

Harris County: Eli Marks' A. B. Cohn 1, wildcat on the west flank of Esperson dome, flowed on initial production test an undisclosed amount of 51- to 52-gravity condensate to open a new area. The test was made in open hole, 5½-inch casing being set to 9087 feet with total depth 9093 feet. Flowing pressure on tubing was 3275 pounds. Further tests are to be made in the hole.

Brazoria County: Estimated gauge of McCarthy Oil and Gas Corporation's Marie B. Nickel 1, wildcat discovery in the Baileys Prairie field area, has been set at 70 barrels of 56-gravity condensate and 3½ million cubic feet of gas daily through ¼-inch choke. Production is from perforations at 9100-10 feet. Total depth is 12,007 feet with 7⅝-inch casing set to 10,760 feet.

Matagorda County: Ralph Johnston et al's Surkamp 1, taken from The Ohio Oil Company on a farmout, flowed oil on initial test of perforations at 8531-34 feet. Gauge of this flow was 5 barrels of 47-gravity oil hourly through ⅛-inch choke with 2650 pounds pressure. Perforations were squeezed and casing was perforated slightly lower in an attempt to cut down the gas flow. Total depth is 10,055 feet with 5½-inch pipe set to 9470 feet. The Surkamp 1 is 9700 feet south of Magnolia's Tide Haven field discovery well and 7000 feet southwest of Johnston's Live Oaks Farms 1, rich gas-condensate producer.

Skelly Oil Company's Albert F. Gest 1, wildcat 1½ miles southeast of East Bay City production, has cored sand with oil odor at the 8400-foot level. This was the only core with oil odor of numerous ones taken from 8170 to 8400 feet. The drill is now below 8800 feet.

Orange County: Second well for North Port Neches field is Gulf Oil Corporation's C. K. Akers 1, 726 feet southwest of Hinkle Drilling Company's discovery. On initial test the well flowed an estimated 5½ barrels of high gravity oil hourly through ⅛-inch choke with 2600 pounds flowing pressure and gas-oil ratio of 5490/1. Total depth is 8834 feet with 5½-inch pipe set to 8825 feet and perforated for completion at 8767-94 feet.

W. V. Bowles & Company's Granger Heirs et al 1 has discovered a new sand on the southeast flank of Orange field production. From perforations at 4725-35 feet the well flowed 6 barrels of 60-gravity condensate and 1 million cubic feet of gas daily through ⅛-inch choke. Total depth is 5317 feet with 5½-inch casing set to 4784 feet.

Oil Pictures Exhibited

A group of oil industry paintings, from the Standard Oil Company (New Jersey) collection, are on exhibit until January 5, 1947, at The Museum of Fine Arts of Houston. These documentary paintings, on loan to Humble Oil & Refining Company for the Houston showing, are entitled "Oil 1940-1945" and include both domestic and foreign subjects with war angles featured.

☆ South Louisiana

Kaplan Area Wildcat Rated Prospective Field Opener

Kaplan area wildcat is prospective field opener; Stanolind testing Bayou Mallet wildcat; potential run on Reddell extension well; Magnolia's 4 mile southwest Mamou wildcat testing; new producer for West Tepetate finaled; Gulf of Mexico wildcat drilling below 11,820 feet.

Vermilion Parish: Humble Oil & Refining Company's Alfred Romaine et al 1, deep wildcat in the Kaplan area, 25-12s-1e, is a prospective field opener. On initial test pipe was perforated at 11,769-75 feet where salt water was recovered. These perforations were squeezed and pipe was perforated for a second test at 11,065-71 feet where the well flowed 102 barrels of oil daily with an equal amount of salt water. The company is expected to squeeze these perforations in an attempt to shut off the water. Total depth is 12,482 feet with 5½-inch pipe set to 11,876 feet.

St. Landry Parish: Stanolind Oil & Gas Company has set 5½-inch production pipe to total depth of 9861 feet in the Ezeb Guillory 1, wildcat approximately 1½ miles northeast of production at Bayou Mallet, and production tests are being made. No details of the tests have been released, but the hole is reported to have numerous sands with oil and gas shows. The wildcat is located in the southwest quarter of 29-6s-2e.

Evangeline Parish: Potential gauge of Continental Oil Company's Pardee 7, mile northeast extension to Reddell field, was 216 barrels of 52.1-gravity condensate daily through 12/64-inch choke. Flowing pressure on the tubing was 1250 pounds and shutin pressure 3000 pounds with gas-oil ratio 8180/1. Total depth is 10,040 feet with 6-inch casing set on bottom and perforated for completion at 9955-80 feet.

Magnolia Petroleum Company's T. Reed Estate 1, wildcat 4 miles southwest of Mamou production, topped the Wilcox at 11,875 feet and has made 2 tests slightly below the 12,000-foot level. Salt water was recovered in the tests

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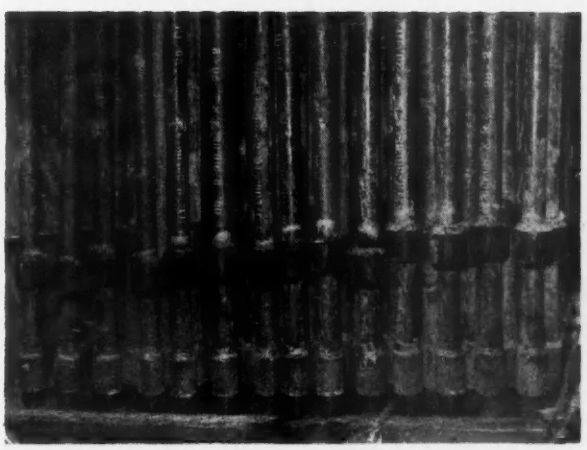

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made at 12,280-90 feet and 12,190-96 feet. Other tests were to be made in the hole. Total depth is 12,365 feet with 7-inch casing set on bottom.

Jeff Davis Parish: Barnsdall Oil Company's W. C. Peters et al 2, West Tepetate field, has been completed as a new producer. On potential the well flowed 179 barrels of 36.9-gravity oil daily through 10/64-inch choke with gas-oil ratio 1871/1. Flowing pressure on tubing was 1500 pounds and casing pressure 2280 pounds. Total depth is 8562 feet with 5½-inch casing set on bottom and perforated for completion at 8395-8400 feet.

Terrebonne Parish: Magnolia's Gulf of Mexico operation, State 1, Mineral Lease 673, is below 11,820 feet in shale. An electric log run to 10,890 feet indicated no shows.

☆ North Louisiana

De Soto Wildcat to Get Test; Smackover Prospects Drilling

De Soto wildcat preparing to test; deep Smackover tests drilling in Webster and Claiborne parishes; Caddo wildcat being watched as potential link with Waskom area, East Texas.

De Soto Parish: F. A. Callery's Bessie C. Strauss 1, 19-14n-14w, wildcat 1 mile west of Gloster, was swabbing to test perforations opposite 4070-77 feet. Casing was perforated at 4078-80 feet and squeezed to obtain shutoff. Total depth is 7085 feet. No showings were found in the lower levels and 7-inch casing was set at 4125 feet.

Webster Parish: Cotton Valley Operators' Sam Banks 2, C SE NW 34-21n-10w, Smackover lime test in the Cotton Valley field, is drilling below 10,421 feet. A core from 10,380-86 feet recovered shale with lime trace but no showings. Bossier was topped at 9118.

Claiborne Parish: The Ohio Oil Company's W. E. DeLoach Account 3-H-1, 22-23n-8w, deep Smackover producer in the old Haynesville field, is being reworked after the flow of oil and gas suddenly ceased. The difficulty was thought to be caused by collapse of packer. Tubing will be pulled and rerun to resume testing. The well went to 10,740 feet, and originally produced 253 barrels of 54-gravity condensate from 10,192-388 feet. Operators shut off the lower level and reperforated with 168 shots from 10,064-106 in the upper Smackover.

F. B. King-C. W. Sharp's Minnie Lowenberg 1, 18-21n-7w, Smackover lime test for the old Homer field, is below 5510 feet. Pettit was topped at 3800, Travis Peak at 4080 feet.

Caddo Parish: Keen interest is centered on Stanolind Oil & Gas Company's Fred Wappler 1, 20-17-6w, Greenwood area and near the Waskom (Harrison County, Texas) field. The F. Wappler is now below 3810 feet.

☆ Arkansas

Columbia County Test Near Village Field Has Gas Shows

Good gas indication in wildcat 5 miles northwest of Magnolia, Columbia County; Lafayette County offset adds new production near Lewisville.

Columbia County: McAlester Fuel Oil Company's wildcat, Warnock Estate A-1, C NW NE 6-17s-19w, 2 miles northwest of Village field, set 5½-inch production pipe after tests at 7383-7407 feet had good gas indications. Total depth of 7417 feet corresponds to producing zones in Magnolia and Village fields.

McAlester Fuel Oil Company's F. A. Wynns 1, wildcat 5 miles northeast of McNeil, 4 miles south of Stephens, and 5 miles from Wesson field in Ouachita County, has been gauged on pump for 45 barrels of 28-gravity oil and 43 barrels of salt water daily from 3500-12 feet after hole went to 6627 feet in the Smackover. The well opens a new Pettit field, but reserves are calculated to be small.

Lafayette County: McAlester Fuel Oil Company's Rook 1, SE NE 17-16s-24w, west offset to the Adams discovery of the west Lewisville field, will probably become the second producer in the area. While not completed, the test produced 36 barrels of 41-gravity oil per hour on drill-stem test from 3818-30 feet. Top of the oil sand was hit at 3820 feet. Completion for potential test is expected with a few days. Operators are now drilling below 3835 feet.

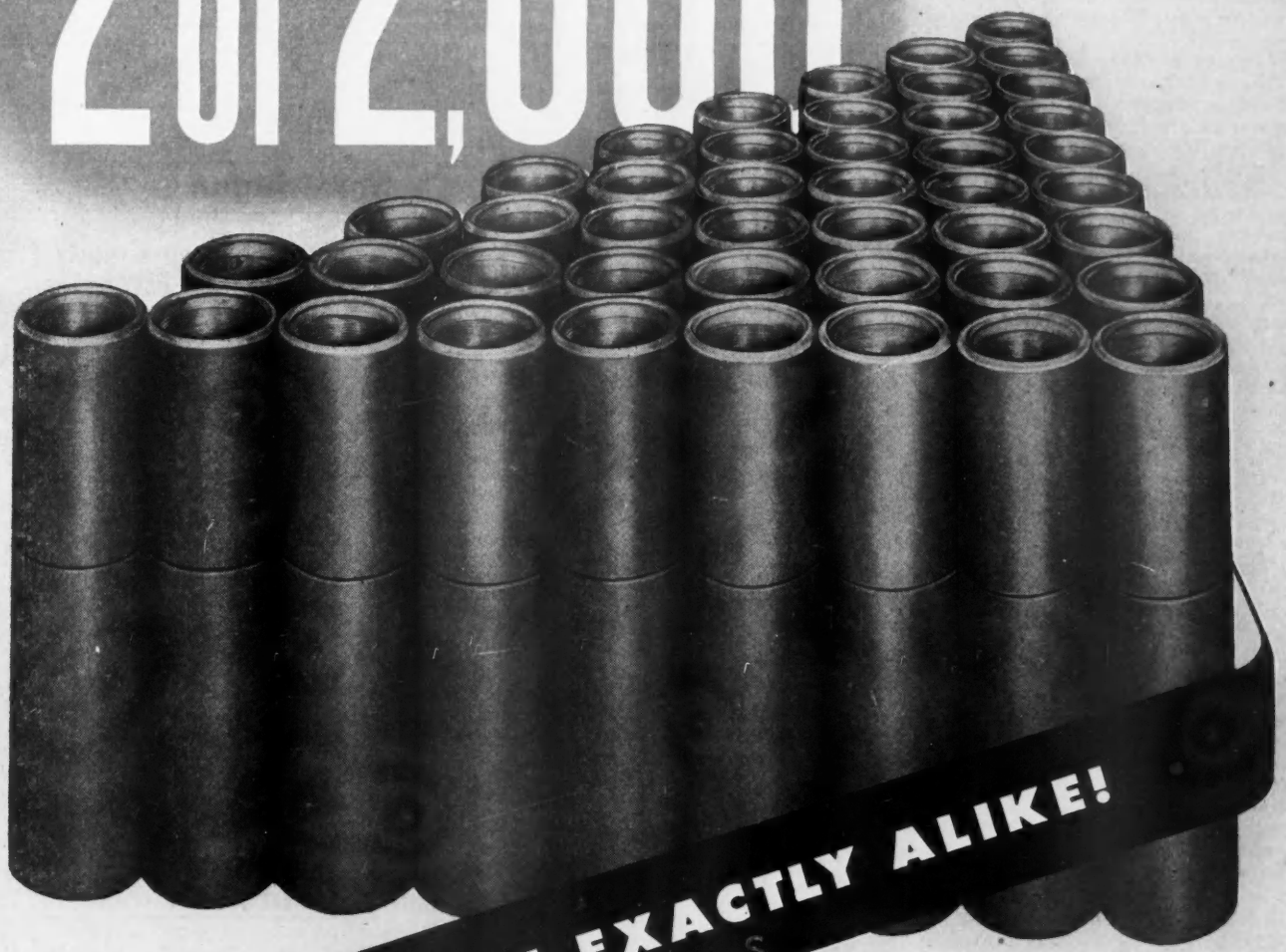
☆ Mississippi

Adams County Has Discovery; State's Western Area Active

Adams County has discovery; activity lively in western section of state.

Adams County: Phillips Petroleum Company's Mrs. Vic Artman 1, 36-8n-

2 or 2,000



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2w, has been completed as an oiler in the Wilcox zone. The new field, which is about 6 miles northeast of Natchez, will be the fourth for the county and the third discovery in the state this year. Salt water which had previously caused trouble was successfully eliminated, and with production established from a section between 5618-22 feet, the well flowed 113.6 barrels of oil per day through 9/64-inch tubing choke. Tubing pressure was 425 pounds and gravity of the oil 40.9.

Vaugney & Vaugney's R. Lee Parker 1, SEc 9-6n-2w, which is undertaking to extend production ½ mile west in the LaGrange field, has been turned into tanks. After perforating opposite the Wilcox horizon at 6243-46 feet and with packer at 6218 feet, the well flowed at the rate of 132 barrels of 43.6-gravity oil per day through ⅛-inch top tubing choke. In the Carthage Point field The Pure Oil Company's Geo. W. Armstrong 1, SWc 13-6n-3w, has been successfully completed. Casing was perforated at 10,229½-47½ feet in the Massive sand zone and on initial test flowed 83 barrels of 55.4-gravity condensate and 1,544,000 cubic feet of gas per day.

Forrest County: The Superior Oil Company's Cassie Bradford 1, SEc SW NW 1-3n-13w, deep wildcat, is reported testing at approximately 12,500 feet. Morgan-Norton's Y.S.A. 1, SE SW 15-1s-13w, is drilling after running electrical log to 9035 feet. Cores from 8593-8615 feet recovered fairly porous ashy sand with salt water. No shows have been reported.

Lincoln County: Crescent Drilling Company's J. F. Vernon 1, SEc 31-8n-7e, prospective field extension, continues to swab hole in an effort to establish production. A drill-stem test with packer at 10,418 feet in the Massive sand zone resulted in recovery of heavy oil and wash water. Well is now flowing small amounts of oil. The California Company's T. H. Smith 1, NEc 3-7n-7e, northern limits of the field, appears to be a commercial producer although although heavy amounts of salt water are noted. Casing was perforated at 10,500-22 feet and swabbed at the rate of 85 barrels of fluid a day of which 50 percent was salt water. After pump was installed well continued to produce oil and salt water. In the Mallalieu field Humble Oil & Refining Company's M. C. Randall 1, SEc 17-6n-8e, has been completed with an initial flow rate of 500 barrels per day through 3/16-inch tubing choke. This is one of the best production rates ever made in this area. Production is from the lower Tuscaloosa at 10,467-86 feet and gravity of the oil is 38.4 with no salt water percentage.

Clarke County: Hunt Oil Company's Long Bell Petroleum Company 3, SWc 29-1n-18e, appears to be making a commercial producer for the first completion in the Langsdale field in almost a year. Eutaw was perforated at 3974-3800 feet and oil and wash water were swabbed. Well is now waiting on pump.

Mississippi Scouts Elect

Mississippi oil scouts elected Gayle Griffin their president to succeed LeRoy Francis. State editors for the national yearbook are Virgil W. Michael and John McWilliams. Other officers elected were Harry Edgeworth, vice president; R. B. Morton, secretary; and Raymond Shively, treasurer.

☆ Ohio

Gas Strike Made in Blue Rock Township, Muskingum County

Gas discovered in southeast Blue Rock; Clinton gas found in Salt Creek; Somerset gas extension; second gas discovery made east of Bedford; Chester extended north.

Muskingum County: A gas discovery 3 miles northeast of the Bloom pool was made by Four Way Oil & Gas Company with W. D. Miller, NE NW 36, Blue Rock Township. Clinton sand, found at 4660-92 feet, paid off from 4679-88 feet for a total of 4250 cubic feet of gas. Another large gas well was completed in Sect. 21, Salt Creek Township. Wasson & Company's Hattie Murphy 4 reached the Clinton at 4075 feet and at 4099 feet the well gauged 5 million cubic feet of gas.

Perry County: Morrow and Shrider's W. E. James 4, NE SW 18, Reading Township, cased off the Berea sand gas and was drilled down to the Clinton. Top of the sand was reached at 2798 feet and drilled 15 feet in with 1,650,000 cubic feet of gas natural.

Meigs County: The second Berea sand gas pool east of the Bedford pool was found in Orange Township 3 miles east and 4 miles due north of the New Chester pool. The discovery, Theiss et al's C. C. Hawk 1, SW NE 17, drilled 3 feet into the sand, 1641-44 feet with a natural gauge of 500,000 cubic feet of gas. The third gas well completed in Chester pool was Mathews Oil's Chas. C. Reed 1, SW NE 14, Chester Township. Berea sand, 1630-35 feet, gauged 775,000 cubic feet natural with a rock pressure of 760 pounds.

Charles W. Teater Named Head Of Michigan Oil, Gas Group

Charles W. Teater of Saginaw, independent producer and contractor, was elected president for 1947 of the Oil and Gas Association of Michigan. He will succeed W. P. Clarke of Saginaw, manager of the land and geological division, Gulf Refining Company.

Officers reelected: George W. Talbot, president Talbot Oil Company, Saginaw, vice president; Arthur H. Ledbeter, Mt. Pleasant, office secretary; O. H. Kristofferson, consulting geologist, Mt. Pleasant, and W. B. Peck, manager producing division, The Pure Oil Company, Saginaw, cotreasurers; and Harold M. McClure, independent producer, Alma, executive secretary.

Marion County Likely to Get Strike in Salem Field Area

Discovery looms for Marion County; extension for Cumberland County pool seems certain.

Marion County: Paul Doran's Millican Estate 1, SW SW SE 16-3n-4e, 13 miles northeast of the Salem field, is making 50 barrels of oil daily from McClosky lime at 2490-95 feet after 1000 gallons of acid. Operators are preparing to reacidize the pool opener.

Coles County: E. P. Jarvis' Atwell 1, SW SE SE 6-11n-9e, 8 miles east of the Mattoon field, is a new wildcat drilling below 1250 feet.

Moultrie County: Ben J. Taylor's Hardinger 1, SW SW NE 21-12n-6e, 8 miles west of the Mattoon field, is testing Aux Vases sand at 1933-67 feet on pump. The well was reported making 5 barrels of oil and 10 barrels of salt water daily.

Cumberland County: National Associated Petroleum Company's Krogman 4, NW SW SE 31-9n-7e, ½ mile southwest of the discovery well of the small Lillyville pool, has set pipe for production test of McClosky lime at 2420-30 feet. During a drill-stem test the well flowed oil in 4 minutes and had much better prospects than the few wells in the pool.

☆ Michigan

Carter's Oceana County Find Tops Potential Estimates

The Carter Oil Company's Miller 1, NE SW SW 11-13n-18w, Oceana County, Stoney Lake oil discovery, showed 3 times its first potential estimates when actually tested on a bottom-hole pressure and flow check. Flowing through ¼-inch choke from 2½-inch tubing, the well made 95 barrels in 4 hours and 171 barrels in 6 hours to earn potential rating of 570 barrels at 24-hour rate when computed against bottom-hole pressure variations.

Carter's wildcat, discovered following extensive core drill survey, is producing from Traverse lime at 1629-31 feet. No new locations have been staked.

Lake County: C. W. Collin's Pomorski 1, SW SE SE 14-18n-12w, 8 miles west of the Reed City field, logged Dundee lime at 3385 feet and Monroe dolomite at 3520 feet and was finally abandoned at 3664 feet without logging oil or gas shows.

☆ California

Texas Locates Second Well In Belgium Anticline Field

Texas stakes location for second well in new Belgian Anticline field; drill pipe remains stuck in world's record well in Kern County; 2 wells reach objectives in new Alondra field; new deep test planned in Long Beach field.

Kern County: The Texas Company is preparing to drill its second well in the Belgian Anticline area south of the McKittrick field. In 29-30s-22e, about ¼ mile west of its West Pet 1 discovery well, operator has located West Pet 2. The discovery well, drilled about 4 months ago, flowed 8 million cubic feet of wet gas on production tests and then was shut in. The producing sand is believed to be the equivalent of the Oceanic sand in the Cymric field. About ½ mile south of the new Texas location, Tide Water Associated Oil Company is drilling Midway-McKittrick 5-32 below 4810 feet in hard brown shale.

Universal Consolidated Oil Company's outpost test, Sauerdough 9 in 23-29s-21e, logged 40 feet of Oceanic oil sand from 4810-50 feet and is making formation tests. Union Oil Company's M. & L. 1 in 20-29s-21e logged Carneros sand from 2622-2833 feet and crew is running 7-inch casing. Total depth is 2845 feet.

It is unlikely that Pacific Western Oil

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POINT 3—It must not only be *straight*, but straight when it is "relaxed"—free of all residual internal stresses in the metal. A drill collar that isn't "relaxed" when it is straight, that has internal forces pulling against one another, will soon bend and warp in service as these stresses are relieved.

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BUT THAT'S NOT ALL. Baash-Ross does NOT obtain this hard surface and tough core by severe *liquid quenching* because that would leave high residual stresses in the metal—stresses that would cause the drill collar to warp and bend in service in order to assume a stress-free condition.

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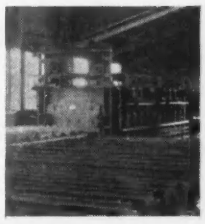
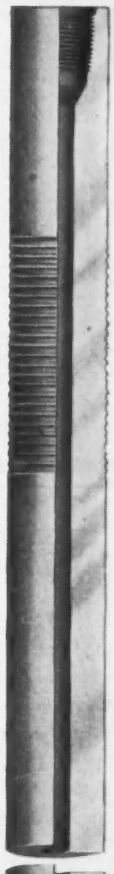
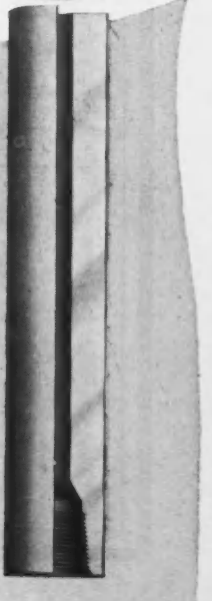


Full-length heat treating furnaces give uniform structure end-to-end.

Result: **"Balanced" physicals of hardness and toughness are combined in a product that is fine grained—*and has no residual stresses to cause warping or bending in service.* In addition, other important properties are built into Baash-Ross Drill Collars as outlined below.**





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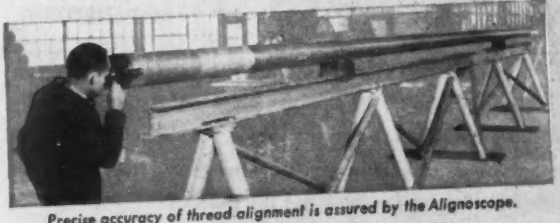

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Your nearest Baash-Ross representative will gladly give you further details on the painstaking care that goes into the manufacture of every "Trubore" Drill Collar. Or write direct!

Corporation's National Royalties 1, wildcat, 5-26s-22e, which early this month broke the world's depth record by 13 feet, will ever be drilled any deeper. When the well reached a depth of 16,668 December 3, the drill pipe stuck near bottom. Circulation was maintained, however, and there remained some hope of freeing the pipe. But on December 16, circulation was lost. Magna-Tector device was then run a second time to make certain the highest point at which the pipe is frozen. The operator's present plan is to cut the drill pipe just above that point and pull out. Tests of uphole showings, if any, will be made and if nothing of interest is found the well will be abandoned.

Richfield Oil Corporation completed another good well in the Santiago area of the Midway-Sunset field. Operator's Leutholtz A-11 in 22-11n-23w is flowing 780 barrels of 19-gravity oil through ½-inch choke. Depth is 3540 feet.

Los Angeles County: Two wells have reached their objectives in the Alondra field, discovered last summer. On a stepout location in 22-3s-14w, British American Oil Producing Company's Alondra Park 1 began coring oil Conglomerate at 9230 feet and has set 7-inch casing at that depth. Crew is preparing to core below 9253 feet. Seaboard Oil Company and Texas are also interested in this well. About ½ mile southeast of the discovery well in Sect. 26, Texas and Seaboard's Gardena Community 9-1 has reached 9702 feet. More than 100 feet of oil conglomerate has been cored but it looks wet.

R. W. Jerman plans a deep test in the old part of the Long Beach field. Location will be near the northeast corner of 31st and Elm streets.

Seaboard has plugged back Mission Land 8-1, wildcat near Newhall in 25-3n-16w, to 7760 feet and will test upper showings. If these are of insufficient importance the well will be abandoned. Total depth is 9528 feet.

Kings County: Interest continues in the northwest extension of the Trico gas field. Lebow and McNee staked location for Hacienda 1 on a 2000-acre parcel in 11-24s-22e, about 1¼ miles west of production. Across the county line to the east in Tulare County, Shell Oil Company has staked location for Alpaugh Unit 3 in 6-24s-23e, the third location in its recently launched development program in this area.

☆Rocky Mountain Area

Deep Test in Steamboat Butte Field, Wyoming, Is Failure

Test in Steamboat Butte field, Wyoming, is failure; Madison lime strike in Park County on production; southeastern Colorado tests abandoned.

Wyoming

British American Oil Producing Company's deep test in the Steamboat Butte field, north of Lander, Tribal 6-E, NW NE NW 5-3n-1w, Fremont County, is reported a failure in the Amsden and Madison formations. The Amsden was topped at 7253 feet and made some gas and small shows of oil in the lower section. The Madison lime was very hard and tight at the top at 7368 feet but was drilled to 8006 feet, total depth, before the well was plugged back and again tested in Amsden. Casing was perforated in various sections of the Amsden but tests showed no commercial production and the well is now being plugged back to be completed in the Tensleep. Production at Steamboat Butte was discovered in 1943 in the Sundance and Tensleep and British American now has 12 wells producing approximately 6000 barrels per day from those horizons.

Park County: At the important Elk Basin well, 38-M, NE SE NE 24-58n-100w, Madison lime discovery, Stanolind Oil & Gas Company has cleaned the hole of water and the well is producing through choke at the rate of 10 barrels of clean oil per hour from the lower section of the formation between 4680-5013 feet. Madison was topped at 4350 feet and the upper section of the formation was more porous, so liner was run in order to acidize with 2000 gallons in the lower zone. Stanolind may now perforate liner in the upper zone for a more thorough test of the entire Madison.

Washakie County: The G & G Drilling Company (Parker Brothers-The California Company et al) wildcat at Neiber Dome, south of Worland, at Unit 1, SE NE NW 19-45n-92w, is in the Madison lime below 10,770 feet and finding some saturation. The well, which is another of the deep Basin tests, cored between 10,740-768 feet and recovered limestone with slight saturation in the top but hard and dry in the base. About 200 feet of the Madison probably will be drilled before operators test this showing and also saturation in upper sands.

Colorado

Two important wildcat tests were abandoned in the southeastern Colorado play. Skelly Oil Company's second test of its Springfield block at Glasgow 1, NWc 22-33s-44w, Baca County, was being plugged at 5629 feet, total depth, after finding no shows in the Mississippian or basal Pennsylvanian sands. A small show of oil was logged in samples between 3705-27 feet in the Lansing-Kansas City, but on test the recovery was only 60 feet of drilling mud. This well is 1½ miles north of Skelly's first wildcat on the block, which went to 6172 feet.

Sharples-Huber-Frontier companies' Jacobson 1, 28-29s-50w, was abandoned at 3622 feet, total depth, and operators will release no information on the well until completion of the 4-well program scheduled when Sharples Corporation of Denver negotiated a one-third interest in the block last summer. The 125,000-acre block is along the Baca-Las Animas County line, extending into southern Bent County, and the first test at Murray 1, SW SW SE 26-29s-50w, 2 miles east of the second failure, was abandoned at 5605 feet, total depth.

La Plata County: T. C. Hudson, Tulsa independent oil operator, has the prospects of an oil pool opener. If the well is successfully brought in, it will be the first commercial oil strike for the county.

Two miles south of Breen, the well is Schmitt 1, CNW NE 36-34n-12w. Pay sand was found at 2995 feet, and oil began filling the hole when the drilling bit was only a short distance in the formation.

Hudson said the oil continued to rise in the hole, although the hole was caving badly, and despite obstructions in the Mancos shale, which overlies the oil-bearing zone.

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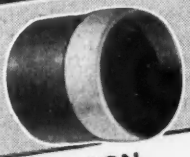

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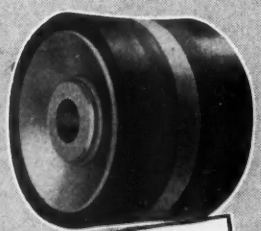

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EXPLORATORY COMPLETIONS

ARKANSAS WILDCATS

Columbia County—Oil Discovery: Atlas O&R Co.'s R. A. Wynn 1, sw sw 8-16s-19w, 2 mi s Shallow Stephens prod, Saratoga 1840-2184, Ozan 2210-2230, Tokio 2505, James 3240, Pettit 3457, Buckner 6365, Smackover 6574, perf 120 shots 3500-12, pump 45 bbls oil, 43 bbls sw, comp 12-5-46 at 6627.

St. Francis County—Failure: Coker-Martin & Beals' Bryan 1, 520 fr s&el 17-4n-3e, abnd 12-11-46 at 2735.

CALIFORNIA WILDCATS

Kern County—Failures: East San Emidio Oil Land Co.'s Barlow Corehole 1, 30-31s-30e, Arvin area, abnd 12-10-46 at 1450.

Jergins Oil, Operator's K.C.L. 68-8, 8-29s-27e, Fruitvale area, abnd 12-7-46 at 4667 ft.

Fresno County—Failure: Union Oil Co.'s S.P.L. 75-19, 19-16s-17e, Helm area, abnd 12-11-46 at 8492.

Tulare County—Failures: United Exploration Co.'s Monroe Unite 1, 12-18s-23e, Goshen area, abnd 12-7-46 at 3826.

General Pet. Corp.'s Moran 42-30, 30-22s-26e, Pixley area, abnd 12-11-46 at 4648.

Santa Barbara County — Failure: General Pet. Corp.'s Goodwin 1, 10-9n-35w, Casmalia area, abnd 12-9-46 at 4673.

COLORADO WILDCATS

Baca County — Failures: Sharples-Huber-Frontier's Jacobson 1, se se se 28-29s-50w, Freezout Creek, abnd 12-8-46 at 3622.

Skelly's Glasgow 1, nw nw nw 22-33s-44w, Springfield area, Lansing-Kansas City 3494, basal Pennsylvanian arkosic sd 5208-5407, Mississippi lime 5462, abnd 12-14-46 at 5629.

ILLINOIS WILDCATS

Bond County—Gas Discovery: Bond County Gas Co.'s Harrwood 2, se ne sw 36-7n-4w, flow 2 mln gas fr Pennsylvanian 749-53, td 753.

Greene County — Failure: Clark-Crawford Syndicate's Davidson 1, ne ne sw 9-9n-12w, abnd 1510.

Moultrie County—Failure: Earl Landon et al's Cuffle 1, nw se ne 25-13n-6e, abnd 2149.

Washington County—Failure: C. E. Brehm et al's Bossen 1, nw nw sw 6-1s-1w, abnd 1751.

Wayne County—Failures: Nat. Assoc. Pet. Co.'s Feather 1, sw se ne 1-2s-5e, abnd 3225.

E. T. Robinson's Ploesser 1, se se nw 27-2s-5w, abnd 3330.

INDIANA WILDCATS

Greene County — Failure: D. H. Smith's Fuller 1, 23-8n-4w, abnd 2440.

Pike County—Failure: W. O. Eckstein et al's Young 1, ne nw ne 2-3s-8w, abnd 1491.

Posey County—Failure: Continental's Cooper 1, nw sw se 12-4s-14w, abnd 3351.

KANSAS WILDCATS

Butler County—Failure: Sid Johnson et al's Jones 1, sw sw sw 28-27s-5e, abnd 2818.

Greenwood County—Failure: Ward McGinnis' Ramsey 1, ne sw ne 20-26s-12e, abnd 1169.

McPherson County—Failure: Barbara Oil Co.'s Lovett 1, sw sw ne 2-19s-1w, abnd 2980.

Phillips County—Failures: Stanolind's Brenneke 1, se se se 2-4s-19w, abnd 3788.

D. G. Hansen's Sullivan 1, ne ne sw 35-5s-21w, abnd 3660.

Saline County — Failure: Westgate-Greenland's Baird 1, sw nw nw 19-13s-3w, abnd 3886.

Wilson County—Oil Discovery: Ruth Lane et al's Campbell 1, se se se 19-28s-15e, pump 30 bbls fr Bartlesville 1423-53, td 1529.

KENTUCKY WILDCATS

Henderson County—Failure: Fisher Oil Co.'s Pritchett 1, 24-0-22, abnd 2730.

McLean County — Oil Discovery: Sohio's Pinkston 1, 7-N-27, pump 66 bbls fr Jackson 1737-48, td 1775.

NORTH LOUISIANA WILDCAT

Richland Parish—Failure: R. T. Sellars-R. D. Kellogg's John Hemler Est. 1, c nw nw sw 12-16n-6e, 3 mi e Lucknow, abnd 12-7-46 at 3356.

NORTH LOUISIANA OUTPOST

Claiborne Parish—Lisbon Extension: Hassie Hunt, Tr.'s Fuller 1, 1391 fr s&wl 33-22n-4w, perf 60 shots 5160-70 in Travis Peak, flow 462 bbls 35-gr, ¼-in, cp 1100 lbs, tp 2700 lbs, gor 1619/1, comp 11-28-46 at 7914.

SOUTH LOUISIANA WILDCATS

Plaquemines Parish—Failure: Texas Co.'s State-Delta Duck Club 19, 2010 s 1092 e of nwc 4-21s-20e, 1½ mi se nearest Delta Duck Club producer, abnd 12-11-46 at 9806.

St. Mary Parish—Failure: Amerada's Habert 1, begin nwc sect 12 th s 15° 30 min e 3200, th n 75° 30 min e 367 to lcn in 12-14s-9e, w flk Charenton fld, abnd 11-29-46 at 7053.

SOUTH LOUISIANA OUTPOST

Evangeline Parish—Reddel Extension: Continental's Pardee Co. 7, n 1650 fr sec sect 17 th 1650 n&w to lcn 17-4s-1w, 1 mi ne gas-dist prod, perf 72 shots 9955-80, flow 216 bbls 52.1-gr, 12/64-in, gor 8180/1, comp 11-29-46 at 10,040.

MICHIGAN WILDCATS

Allegan County—Failure: Smith Pet. Co.'s Stevens 1, ne ne sw 10-1n-16w, abnd 12-12-46 at 1218.

Gratiot County—Failures: Sohio's Probst 1, nw se nw 34-10n-3w, abnd 12-11-46 at 975.

McClure Drlg. Co.'s Crum 1, ne nw nw 21-12n-4w, abnd 12-13-36 at 3514.

Isabella County—Failure: Wicklund Dev. Co.'s Gamble 1, nw nw ne 23-16n-5w, Dundee lime 3970, abnd 12-15-46 at 4132.

Lake County—Failure: C. W. Collin's Pomorski 1, sw se se 14-18n-12w, Traverse lime 2793, so&w 2802, Dundee lime 3385, Monroe dolomite 3520, abnd 12-14-46 at 3664.

Ottawa County—Failure: Crown Well Service's Holleman 1, se ne nw 23-5n-13w, Traverse lime 1829, so&w 1830, abnd 12-14-46 at 1836.

Ogemaw County—Failure: Sun's Spanmacher 1, sw sw se 7-22n-4e, Dundee 2718, abnd 12-15-46 at 2932.

MISSISSIPPI WILDCAT

Adams County—Oil Discovery: Phillips' Mrs. Vic Artman 1, 36-3n-2w, 6 m ne Natchez, perf 16 shots 5618-22, flow 113.59 bbls 40.9-gr oil, comp 12-5-46 at 5684.

OHIO WILDCATS

Columbiana County—Failure: Frank Brendel's H. C. Johnson 1, nw nw 18, St. Clair Township, Oriskany 4538-44, abnd 12-4-46 at 4544.

Licking County—Failure: Ohio Fuel Gas Co.'s A. Lingafelter 1, Newton Township, Clinton 2308-24, abnd 12-6-46 at 2340.

Meigs County—Gas Discovery: Theiss et al C. C. Hawk 1, sw ne 17, Orange Township, Berea 1641-44, 500,000 gas, comp 12-10-46 at 1644.

Morgan County—Oil Discovery: Industrial Gas Corp.'s Herbert Bankes 1, nw ne 20, Deerfield Township, Clinton 3997-4027, 25 bbls comp 12-4-46 at 4033.

Muskingum County—Gas Discovery: Four Way O&G Co.'s W. D. Miller 1, ne nw 36, Blue Rock Township, Clinton 4660-92, flow 4,250,000 gas, comp 12-11-46 at 4692.

OKLAHOMA WILDCATS

Beckham County—Failure: Four States Oil Co.'s Martin 1, nw nw sw 32-8n-24w, abnd 2210.

Cotton County—Failures: Akin & Dimock's Rogers 1, sw se nw 19-2s-12w, abnd 2527.

Falcon-Seaboard's Tyler 1, ne ne sw 26-3s-11w, abnd 1628.

Wilcox Oil Co.'s Virginia 1, nw se sw 13-3s-11w, abnd 2172.

Hastings & Knight's Henderson 1, se ne se 34-3s-11w, abnd 1801.

H. W. Zweig et al's Thornton 1, ne ne sw 13-3s-13w, abnd 2506.

Sam Harman et al's McCluskey 1, ne se se 32-4s-11w, abnd 2010.

Wayne McCormick's Nelson 1, sw nw nw 1-5s-12w, abnd 1855.

Akin & Dimock's Brown 2, sw sw sw 6-5s-12w, abnd 2255.

Garvin County—Failure: Big Chief Drlg. Co.'s Blackwood 1, ne nw sw 6-4n-1w, abnd 6503.

Okfuskee County—Gas Discovery: Sunray Oil Corp. et al's Sam 1, ne ne sw 10-10n-9e, flow 6,500,000 gas fr Pennsylvanian 3056-69, td 3069.

Okfuskee County—Failure: Decem Prod. Co.'s Armbrister 1, ne sw sw 34-13n-7e, abnd 3820.

Osage County — Failure: Ohio Oil Co.'s Osage 1, se se ne 2-23n-8e, abnd 2708.

Stephens County—Failures: R. L. Fisher's Johnson 1, nw nw sw 22-2s-9w, abnd 2510.

Guy Fitzgerald's Oliphant 1, sw sw ne 2-3s-9w, abnd 2435.

Tillman County—Failures: S. D. Johnson's Fisher 1, nw nw sw 22-2s-9w, abnd 2510.

Yandell Rogers' Clapp 1, ne ne nw 12-2s-16w, abnd 2020.

WEST TEXAS WILDCATS

Coke County—Jameson Oil Discovery: Sun's Allan Jameson 1, c se sw H&TC Ry. 253, blk 1-A, 27½ mi se nearest prod, elev 2080, Coleman Junction 3570, Crinoidal 6200, gas-oil contact 6225, flow 168 bbls 46-gr, gor 1684/1, natural, via ¼-in tp 250 lbs, cp 700 lbs, fr Crinoidal reef 6225-45, comp 12-13-46.

Crane County—Failure: Gulf's McKnight 8, c se se PSL 23, blk B-17, elev 2710, Devonian 6687, McKee 8030, Waddell 8404, Ellenburger 8640, abnd 12-15-46 at 8845.

Reagan County—Failure: Humble's Sawyer Cattle Co. 1-C, c se sw T&P Ry. 130, blk 1, elev 2586, San Andres 2060-3900, Strawn 9300, Ellenburger 9815, abnd 12-12-46 at 9960.

Winkler County—Failure: Stanolind's Sealy-Smith 15-A, c ne ne G&MMB&A 88, blk A, elev 2731, abnd 12-6-46 at 6505.

WEST CENTRAL TEXAS WILDCATS

Fisher County—Failure: American Liberty Oil Co.'s Cross 1, 660 out sec sect 46, Bastrop CSL, elev 1849, abnd 12-2-46 at 4872.

Jones County—Failure: Wofford Cain et al's Stephenson 1, 1447 ewl 330 nsl of w½ T&P Ry. 4, blk 16, elev 1706, abnd 12-13-46 at 2200.

Shackelford County—Failure: Roeser-Pendleton-Continental's Cook 3-A-145, 1520 snl 600 wel nw¼ E.T. Ry. 145, abnd 12-6-46 at 1750.

NORTH TEXAS WILDCATS

Archer County—Failures: D. R. Criswell et al's Carpenter 1, 1050 snl 1250 wel sect 90, blk 4, Clark-Plumb sur, abnd at 12-4-46 at 1165.

Harvey Drlg. Co.'s Abercrombie-Taylor 1-Q, 1050 out sec S. Abercrombie sur, abnd 11-28-46 at 1450.

Harvey Drlg. Co.'s Abercrombie 1-U, 1050 nsl 150 wel blk 157, J. W. Harris sur, abnd 12-2-46 at 1330.

M. H. Kennedy et al's Turbeville 1, 150 snl 1320 wel blk 63, Jefferson CSL sur, abnd 7-7-46 at 1501.

McCurdy Bros. et al's Taber 1, 280 snl 150 wel lot 7, Taber sbdn, Dallas CSL sur, abnd 11-23-46 at 1538.

L. H. Choate et al's Warmuth 1, 330 nsl 1052 wel sect 23, blk 3, Clark-Plumb sur, elev 922, abnd 12-10-46 at 4365.

Cooke County—Failures: Dwight M. Ross et al's Owens 1, 150 s&e of nwc J. Dye sur, but in J. Banning sur, abnd 12-10-46 at 1927.

J. R. & Adam Seitz et al's Hensley 1, 178 w 330 s of nwc C. C. Collingsworth sur, but in James Hamilton sur, Ellenburger 4236, abnd 12-8-46 at 4300.

Montague County—Failure: W. H. Riddle-J. P. Ledford's Durham 1, 150 due w of swc of n½ W. J. Wagon sur, but in Francisco Escobar sur, elev 976, abnd 12-1-46 at 1850.

Throckmorton County — Failures: Fred M. Manning's Pearce 1, 330 nsl 1400 ewl of sect 978, TE&L Co. sur, elev 1264, abnd 12-5-46 at 4042.

Fred M. Manning's Timmons 1, 467 out sec sw¼ sect 2163, TE&L Co. sur, elev 1280, abnd 12-1-46 at 4306.

NORTH TEXAS OUTPOST

Montague County—Hildreth Failure: Continental's Copeland 1, 1650 nsl 2400 ewl of 207-ac tr, N. Kimbro sur, 1¼ mi w of n sector of fld, elev 884, Bend 5900, Barnett 6182, Simpson 6460, Ellenburger 6712, abnd 12-14-46 at 6722.

NORTH TEXAS NEW PAY TEST

Wilbarger County—Harrold Discovery: Big Six Oil Co.'s Schlaffke-Morris 1-A (OWWO), 760 nsl 737 wel H&TC Ry. 3, blk 14, originally completed as Mississippi discovery, pb 4246, flow 516 bbls ¾-in initial, 500 gals acid Strawn perf 4230-36, comp 12-3-46 at 5147.

Wichita County—Madden Shallow Discovery: Consolidated Oil Co.'s Wade 2, 990 snl 2041 ewl labor 6, lge 2, Denton CSL, s offset 4200 ft Strawn, elev 1034, pump 62 bbls 42-gr oil, 48 bbls wtr, fr sand 1297-1328, comp 11-18-46 at 1328.

TEXAS PANHANDLE WILDCAT

Parmer County—Failure: Oil Well Drlg. Co. et al's Tharp 1, c se nw sect 40, blk A, Capitol Syndicate Lands, elev 4182, anhydrite 1800, San Andres 2720, Wichita-Albany 5210, Wolfcamp 6090, Cisco 6800, Strawn 7190, granite wash 7275, abnd 12-15-46 at 7511.

SOUTH CENTRAL TEXAS WILDCAT

Milam County—Failure: Trans Gulf Co.'s Lena Fick 1, 330 fr wly/wl 1400 fr nl 40-ac lse, J. J. Acosta sur, Austin chalk 1091, abnd 11-2-46 at 1417.

SOUTHWEST TEXAS WILDCATS

Duval County—Failures: Colonial Pet. Co.'s Frederico Espinosa et al 1, 330 fr swl 620 fr sel 125-ac lse, BS&F sur 309, 3½ mi sw Agua Prieta fld, 4 mi nw Tesoro fld, abnd 12-3-46 at 4715.

Hiawatha O&G Co.'s Atlee Parr 1, 345 fr wl 945 fr sl blk 54, Wheeler-Splane sbdn San Andres Gr, 3385-ac lse, 3 mi e Longhorn fld, abnd 12-7-46 at 6005.

Duval County—Gas Discovery: Hickok & Reynolds' J. F. Welder Heirs 8-C, 990 fr nl 330 fr el 540-ac lse, 4950 fr wl 6270 fr nl Samuel Alexander sur 102, 1 mi w Seven Sisters fld, Loma Novia pay 2521, perf 8 shots 2525-27, flow 3,800,000 gas open, comp 11-30-46 at 3110.

McMullen County—Failures: O. D. Edwards, Jr.'s Annie Graves Dolph et al 2, 1750 fr el 466 fr nl 800-ac lse, 466 fr n&el blk 36, Shumway sbdn of Shiner Rch, Grancisco Gomez sur, abnd 12-2-46 at 1506.

Henshaw Brcs.-E. H. Smith's Nueces Ld. & Cattle Co. 1, 2310 fr sel 990 fr nel T. Roziene sur 166, 3 mi n ne Munson fld, abnd 12-6-46 at 1854.

Webb County—Failures: O. W. Killam's G. B. Moglia 1, 48 fr wl 1438 s of nl of sur 722, on 480-ac lse, 5 mi e ne Carolina-Texas fld, 5 mi s sw Lopez fld, Mirando sand 2460, abnd 11-30-46 at 2718.

Newman Bros. Drlg. Co.-Skinner & Eddy Corp.'s Rosa V. Benavides 1, 330 fr e&swl of e½ sect 713, 320-ac lse, 2 mi nw Cole fld, 2 mi se W. Cole fld, 1st Mirando 2491, abnd 12-5-46 at 3604.

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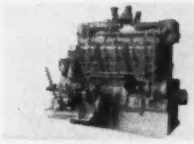

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■ Lumber for sale: 5 cars 3 x 12—10′ to 16′ Hardwood $49.00. 5 cars 3 x 6 & wider Hardwood roadway lumber $43.00 to $49.00. Fir timbers 12 x 12 & larger 40′ to 120′ in length. 1 x 2 and 2 x 2 Surveyor stakes. Hardwood pallets for sale. E. J. Galennie Lumber, Box 1074, Shreveport 89, La.

■ FOR SALE — Complete water purification unit. Brand new, capacity 80 gals. per minute. Also one water pumping unit, complete with two R-33 Continental Red Seal Engines, two 6″ centrifugal pumps, all necessary fittings. Atlas Supply Company, Box 1331, Bakersfield, California.

■ 1—24″, double 3 point Reamer for sale cheap. 1—3000 gal. Butane Tank mounted on truck trailer, located at Vernal, Utah. Large stock of used oil well supplies. Send us your inquiries. Atlas Supply Company, Box 1331, Bakersfield, California.

■ 4 Clark Brothers Compressor Cylinders, 14″ stroke—27″ diameter, lined to 26″. Finished in Van der Horst porous chrome. Valve plates and springs—11 to 13 Chrome. Fixed clearance for 28# to 35# discharge pressure. Designed for inlet of 0# gauge. For Clarke RAS-8 angle and possibly other models. Used less than six months. Inquire c/o Box 112, OIL WEEKLY, Houston, Texas.

■ Four Oil Country boilers 100 horse, 200 pound working pressure in good condition; also, two 1200 foot one inch rotary drilling lines made one 4000 foot hole each; also, Wilson-Snider 6x16 duplex steam mud pump; also, two 122 foot angle iron derricks all located in North Texas. Chas. B. King, 315 Panhandle Bldg., Wichita Falls, Texas.

■ IDECO DRILLING RIG, Steel draw works, mast, band wheel. Cushion top, shock absorber beam, Superior oil engine. Bolted drilling house. Complete line of drilling and casing tools all in exceptionally good condition. Oil Producers, Inc., Murray Bldg., Grand Rapids, Michigan.

■ DRILL PIPE—6500 feet 4½-inch grade D range 2 National Internal Upset with Hughes Acme Streamline joints. Excellent condition. Located Taft, Texas. Hancock Drilling Co., 7045 Chocolate Bayou Road, Houston, Texas.

■ Oil Producing Wells in Petrolio, Ontario, Canada; 270 acres; Absentee Landlords offer to sell or Managership. Any reasonable offer. Write, Attorney, Schlosberg, 186 Joralemon Street, Brooklyn 2, N. Y.

FOR SALE AT A BARGAIN PRICE

1—5-3C Ideal Draw Works, fully unitized;
1—10″ Wilson-Snyder slush pump;
1—12x12″ Gumbo Buster drilling engine;
1—54″ Ideal Traveling Block and a 6″ Wigle spring hook;
1—20″ Oilwell Imperial rotary table;
1—4″ Oilwell Swivel;
1—5 Sheave Boykin crown block.

All of the above for $2,150.00, cash FOB Houston. Write, wire or phone:

H. V. CHOATE
2510 Riverside Drive
J-24397 — Houston, Texas

FOR SALE

FOR SALE
STEEL STORAGE TANKS
90-10,000 Gallon Capacity
Tank Car Tanks
Cleaned—Painted—Tested
Also, a large quantity of used 13″ and 15″ Channel Iron as removed from Tank Car Underframes
Located in Oklahoma

IRON & STEEL PRODUCTS, INC.
41 years' experience
13484-A S. Brainard Ave., Chicago 33, Illinois
Phone: BAYport 3456
702 Ritz Building, Tulsa 3, Oklahoma
Phone: Tulsa 2-9238
"ANYTHING containing IRON or STEEL"

SITUATION WANTED

■ Geologist available for part-time connection in Houston. Box 109, c/o The Oil Weekly, Houston, Texas.

■ Former district landman for major company, now operating independently, will be available for job January 1st. Experience has embraced all phases, including records and titles in nearly every State in Midcontinent. Box 111, THE OIL WEEKLY, Houston, Texas.

ADVALOREM TAX MAN AVAILABLE after January 1 for progressive company that desires to organize a tax department. Six years experience as tax assessor-collector of medium size Texas county. Petroleum major Texas A. & M. 1938. Additional studies in personnel and labor problems. Graduate studies in municipal administration. Age 31. Married with two children. Best of references. Address: Box 107, c/o The Oil Weekly, Houston, Texas.

HELP WANTED

■ Land man for company operating throughout Midcontinent. Must be well rounded and should have wide acquaintance and knowledge of Gulf Coast areas although not absolutely necessary. Replies will be confidential. Box 106, The Oil Weekly, Houston, Texas.

■ Reflection Party Chief by Contract Company. Many years actual Party Chief experience not essential if thoroughly trained in interpretation work and able to handle Party problems competently. State age, education, experience, when available and telephone number in answer. Box 107, The Oil Weekly, Houston, Texas.

WANTED ADVERTISING ASSISTANT

Leading chemical company needs advertising writer and creative man with experience in petroleum products. Will act as assistant to Advertising Manager. Education: Engineering or Chemistry. Age: Under 40. Give full experience and salary required. Will be located in Eastern city. Box 110, THE OIL WEEKLY, Houston, Texas.

SERVICES

■ NOTICE TO OUR CUSTOMERS—On December 2, 1946, Mr. Antonio J. Bermudez was appointed General Managing Director of Petroleos Mexicanos, and Messrs. Antonio M. Amor and J. Serrano Castro were appointed Executive Sub-Directors. Mr. Bermudez succeeded Mr. Efrain Buenrostro, and Messrs. Amor and Serrano succeeded Mr. Manuel Sanchez Cuen, Petroleos Mexicanos, Mexican Government Oil Administration, Carlos Reynoso, Export Manager.

SOUTHWEST TEXAS OUTPOST

Duval County—Palangana Extension: H. H. Howell's Wm. Singer Est. 1-A, 330 fr n&wl 80-ac lse, 2264 fr el 3420 fr sl Geo. Cumberland sur 4, 3350 sw of Howell's Singer 3, gas well disc on e flk of Palangana salt dome, pay 1650, perf 12 shots 1668-73, flow gas, no gge, comp 11-15-46 at 1940.

LOWER TEXAS COAST WILDCATS

Aransas County—Failure: Sullivan & Garnett's L. M. Bracht 1, 2333 fr e&sl 945.61-ac lse, Wm. Lewis sur, 2½ mi n nw Lamar fld, abnd 12-2-46 at 8508.

Goliad County—Failure: Dillard & Waltermire's O. P. Jacobs Heirs 1, 660 fr se&swl 174.5-ac lse, 550 se nl Peter Grass sur, 1½ mi ne Wesser fld, abnd 12-7-46 at 9020.

Hidalgo County—Landa Distillate Discovery: Stanolind's Harry Landa 1, 1320 fr nl 1320 fr el 1510-ac lse, Juan Jose Trevino Porc, 3425 fr el 8600 fr sl del Gato Gr, pay 8380, perf 8390-96, flow 69.6 bbls 55-gr dist, 2.11 bbls fresh wtr, 3,005,000 gas, 3/16-in, gor 43,000/1, comp 11-20-46 at 9512.

Live Oak County—Oil Discovery: Roxie Wright et al's S. F. Beall Est. 1, 660 fr nwl 2640 fr nel 900-ac lse, 660 fr nwl 13,000 fr swl W. J. Cannon sur, 2 mi s sw Mt. Lucas fld, 3½ mi e ne Hinnant fld, pay 5580, perf 31 shots 5582-85, flow 4968 bbls 43-gr,, 3/32-in, gor 1870/1, tp 600 lbs, cp 1165 lbs, comp 11-16-46 at 6658.

Nueces County—Failure: E. A. Graham's Geo. E. Farenthold 1, 330 fr s&el lot 65 and sur 413 and 320-ac lse, 1 mi sw Turkey Crk fld, abnd 12-2-46 at 5511.

Refugio County—Failure: Bering Co.'s Walter Richter 1, 667 fr wl 2400 fr nl 287-ac lse, frac e½ sect 20, Johnson & Pugh sbdn of Bonnie View Rch of G. C. Cobian Gr, 12 mi se Woodsboro, 4 mi e se La Rosa fld, 3 mi s se Bonnie View fld, abnd 11-25-46 at 6687.

San Patricio County—Round Lake Oil Discovery: Hewit & Dougherty-Lonnie Glasscock's W. A. Jennings 1, 660 fr n&wl blk 3 C. C. Smith sbdn and 87.8-ac lse, John McMullen sur, 1¼ mi e se Gallagher fld, pay 5440, perf 48 shots 5442-56, flow 32 bbls 38.7-gr, ¼-in, gor 4312/1, comp 1-19-46 at 5896.

UPPER TEXAS COAST WILDCATS

Colorado County — Failure: Tide Water's Mrs. Ida B. Brandon 1, 10,500 ne Altair prod, start swc E. Laterstein 143.88-ac lse go 1310 e alg sl th 660 s at ra to lcn on 400-ac tr out of 1000-ac lse, G. W. Strawschneider sur, abnd 12-7-46 at 11,451.

Wharton County—Failures: W. A. Clark, Jr.'s Henry Watz 1, 30 fr n&el 80.2-ac lse, I&GN sur sect 15, 3450 s and w of Tabola 1, wildcat gasser ¾ mi w of Hutchins oil disc, abnd 12-2-46 at 4925.

Joe Hornberger, Jr.-John B. Ferguson's J. E. Carlson 1, 330 fr sl 467 fr wl 160-ac tr, se¼ sect 44, W. D. Ivey sur, just w of Withers fld, temp abnd 12-2-46 at 6814.

UPPER TEXAS COAST NEW PAY TEST

Tyler County—S. Ryatt Distillate Discovery: Atlantic's J. R. Dempsey 1, 467 fr wl 660 fr sl 22.51-ac lse, 660 fr sl 330 fr wl L. A. Beard sur, 2100 w sw of disc well, Wilcox pay 10,238-10,300, perf 10,236-272, flow 84 bbls 51.4-gr oil, 4,268,000 gas, ¼-in, tp 4715 lbs, gor 14,047/1, comp 10-25-46 at 10,326.

SERVICES

■ Oil Industry Employment Service, P. O. Box 2603, Tulsa, Oklahoma. For technical and trained personnel. Licensed. Bonded. Confidential. No charge to employees.

ADVERTISING RATES

Trading Post Section

Regular classified advertisements for this special section, set in type this size without border, take flat-rate of 7 cents per word for the first insertion and 5 cents per word for each subsequent insertion of same copy. Display advertisements for this section, set in suitably larger type with ruled border, are $5.00 per inch for the first insertion and $4.00 per inch for subsequent insertions. Remittance must accompany copy which should be sent to:

Trading Post Section, The Oil Weekly
P. O. Box 2608 Houston 1, Texas

SQUEAKS from the BULL WHEEL

Life Is Like This

"Paw," said the farmer's boy, "I want to go to college and learn to be a doctor. Think I'll study obstetrics."

"Likely you'll be wastin' your time, son. Soon as you learn all about this obstetrics, somebody'll find a cure for it."

The Woman's Way

A young widow commissioned a monument cutter to inscribe on her late husband's tombstone: "My Sorrow Is More Than I Can Bear."

Before the work was finished, the widow married again, and the stone-cutter asked her if she still wanted the inscription.

"Why, of course. Just add the word "Alone."

She Knew Better

A school teacher telephoned the mother of one of her pupils:

"He swears terribly on the playground."

"Jes' lak his ol' pappy!"

"And besides that, he slaps all the little girls."

"Jes' exac'ly lak his pappy!"

"And he steals."

"Jes' de spittin' image of his pappy, inside an' out. Lawsy! Is I glad I didn't marry dat man!"

Just Between Pals

Two fellows were knocking a mutual friend.

"To me, he's a pain in the neck."

"Personally, I have a much lower opinion of him."

Hints for Householders

"My husband is in the Navy. He has so few leaves that when he comes home he seems like a total stranger."

"Why, how perfectly, wonderfully thrilling!"

Live Wire People

The young husband away from home received this telegram from his mother-in-law: "Mary gave birth to little girl this morning. Both well."

On the message was a sticker reading: "When you want a boy, call Western Union."

Notions in the Night

"Don't you dare kiss me that way again!"

"Sorry. It was a slip of the tongue."

Clearing the Waters

Fellow we know sent his old Negro servant down to the bayou for a bucket of water. Presently, the Negro returned, his face three shades lighter. "Boss, there's an alligator down there what tries to bite me every time I gits close to the water."

"To heck with that 'gator! You go back down there and wade out and get me a nice, clean bucket of water for my coffee. And remember this, that 'gator is just as scared as you are."

"In that case, boss, you don't want that water nohow. If that 'gator is scared as I is, then that water just ain't fit to drink!"

How Gentlemen Are Made

"Pop, tell me how you proposed to mother."

"Well, son, as I recall it, your mother and I were sitting out on the porch one spring night. The moon was shining through the honeysuckle vine and the tree frogs were making sweet music. Then all of a sudden she leaned over and whispered in my ear. I said, 'You are?' and the next day we were married."

Tru! Tru!

They were discussing the business failure that had caused the most widespread distress.

"I believe the most disastrous failure was the Kruger match works, somebody said.

"No. It was the failure of the Bank of America," another insisted.

"You're both wrong. The business failure that caused the most grief was that of a little haberdashery shop in Missouri."

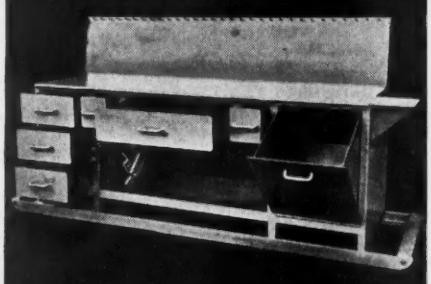
Small Potatoes

Mother and daughter were in the shower together when the little one began to cry.

"Why, darling, what's the matter?"

"'Cause I'm so plain and you're so fancy."

OWEN



Type "A" Work Benches

Keep Tools Where You Need Them—When You Need Them

Yes sir, these benches will really pay off when you're in a bind and need a wrench in a hurry. They keep all hand tools within quick, easy reach and prevent misplacement, damage or loss.

Made of heavy steel plate, they're all-welded for strength and drawers are roller mounted for easy operation. There's plenty of storage space for hand tools, grease guns, rags, etc.

Buy one for each of your rigs . . . they'll save time, tools and tempers.

Sold Through All Supply Stores

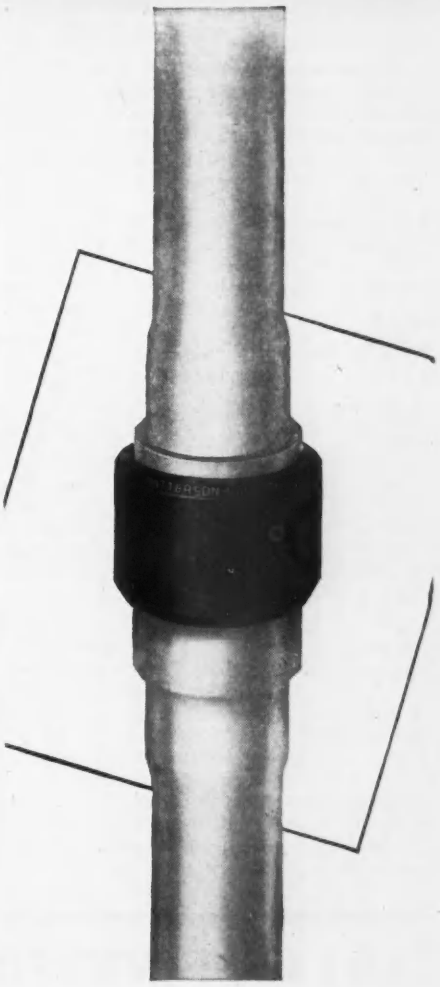
California Distributor: Howard Supply Co., Los Angeles

OWEN TOOL COMPANY

ROUTE 9 BOX 800-B V-2-6341

HOUSTON, TEXAS

"Best Bet Yet"



SAVE YOUR TUBING!

Tubing collars worn by contact with casing steal the profit out of pumping. Patterson-Ballagh Plastic Tubing Protectors prevent both collar and casing wear. Oil-proof, wear-resistant, insulating. They are pressed onto the collar under pressure and will not come off. Made in all sizes. End your tubing troubles. CALL in your Patterson-Ballagh man.

Specify

PATTERSON-BALLAGH

A DIVISION OF BYRON JACKSON CO.

"Best Bet Yet"

PLASTIC TUBING PROTECTORS

1900 E. 65th Street, Los Angeles 1

6247 Navigation Boulevard, Houston 11

808 Graybar Building, New York 17

931 Russ Bldg., San Francisco 4

MEN IN THE INDUSTRY NEWS

E. Gail Carpenter, Wichita, Kansas, was elected president of the Kansas Geological Society for 1947, succeeding **Harold Smedley,** Skelly Oil Company's district geologist. Other officers elected: **Lee H. Cornell,** Stanolind Oil & Gas Company, vice president; **Don W. Payne,** Sinclair Prairie Oil Company, secretary-treasurer; and **R. A. Carmody,** Gulf Oil Corporation, member of the board of directors.

»

Earl B. Noble, manager of exploration, Union Oil Company of California, addressed the Wyoming Geological Society in Casper on "General Geology of Paraguay," using colored slides and pictures of the country.

»

G. P. Zebal, The California Company, has been transferred from New Orleans to Denver as Rocky Mountain development geologist.

»

Gerald H. Westby, president of the Seismograph Service Corporation, has been named president of the Tulsa Chamber of Commerce for 1947, succeeding **N. R. Patterson,** president of Patterson Steel Company. He served as a director, treasurer, third and first vice president of the Chamber during the past nine years. **Harvey A. Heller,** Tulsa independent oil operator, was named first vice president.

E. F. Battson has been elected president of Continental Steamship Company, Baltimore, subsidiary of Continental Oil Company. He is assistant to Continental Oil's president, **Dan Moran,** and will handle the new assignment in addition to his other duties. He has been with Continental 25 years.

»

Lamar Lunt will enter the consulting geologists' field January 1. He will specialize in oil property evaluation, supervision of wells or leases, gas measurement and general production problems in West Texas, where he has been petroleum engineer and production superintendent since 1934.

»

Charles L. Orr, former attorney and secretary of the Interstate Oil Compact Commission, and for the past two years Mid-Continent representative of Independent Natural Gas Association of America, has resumed the general practice of law. His offices are in the First National Building, Oklahoma City.

»

John L. Wroe, assistant attorney general for Texas, will retire in January. Specializing in oil and gas laws, he has been working with the law enforcement division. Wroe is a prominent Houston attorney who was for several years associated with the firm of Hume, Robinson and Hume and other law firms. He was also with Sinclair Oil Company in New York for several years.

W. E. Leroux, division engineer for The Carter Oil Company's Central Division at Seminole, Okla., has been named assistant to the production manager for Carter, with headquarters in Tulsa. He was with the company at Seminole from 1933 until 1938, when he went to Europe with the European Gas & Electric Company. He returned in 1941, and was with Carter at Jena, Ark., for four years, then was transferred to the Northwest Division at Billings, Mont., before returning to Seminole two years ago.

J. L. Rogers, district engineer in the Dix district of Illinois, is being transferred to replace Leroux. He was graduated from Oklahoma A. & M. College in Stillwater and has been with Carter since 1935.

»

Marion M. Vick, formerly senior accounting clerk in the engineering department of United Gas Corporation's Houston Division, was appointed senior accounting clerk in that department. A veteran of 17 years service with United, he joined the Houston Gas and Fuel Company, predecessor of United, as cashier in 1929.

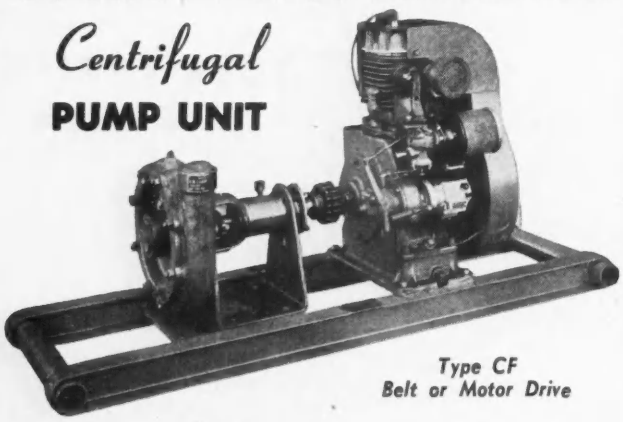
»

Alexander G. Bailey has been named chairman of the Petroleum and Natural Gas Conservation Board of the Province of Alberta. A deputy chairman since 1944, Bailey succeeds the late **Dr. E. H. Boomer.**

LOCKETT-WORTHINGTON

Centrifugal

PUMP UNIT



Type CF
Belt or Motor Drive

NO MATTER what your pumping problem may be, Lockett Dealers — from warehouses located at, or near, the principal oil fields of Texas and Louisiana, and backed by a large replenishing stock at our Houston and New Orleans Warehouses — can supply complete pumping units for every pumping need.

Lockett Dealers can promptly furnish dependable Worthington Pumps, adapted for use with any type or make of power unit — gas, gasoline, Diesel, or electric motor; and, also *genuine* Worthington Repair Parts from near-by warehouse stock.

Today, as heretofore, your best assurance of getting years of efficient, uninterrupted pumping service is to buy your pump needs from a Lockett Dealer.

A. M. LOCKETT & COMPANY, LTD.

NEW ORLEANS HOUSTON DALLAS

PETROLEUM PRODUCTION ENGINEERING

By LESTER C. UREN

Professor of Petroleum Engineering
University of California

Volume I—Oil Field Development. New Third Edition, thoroughly revised and enlarged. During the decade that has elapsed since the publication of the Second Edition, the technology of oilfield parctice has made notable advances, necessitating a broad revision and considerable expansion in the preparation of this, the Third Edition. Wells are being drilled today to far greater depths than were possible in 1934; new and more efficient types of drilling equipment have been developed; new methods of installing and cementing casing in wells have been devised, new techniques of logging, testing and completing wells perfected; the principles governing oil field development practice have become better defined. Engineering has entered into this phase of the producing industry to a greater extent than in any previous decade, with consequent improvement in methods, equipment and efficiency.

Approximately 775 pages, 5¾ x 8¾, Price $7.00

Volume II. Oilfield Exploitation. Here are up-to-the-minute data on how to drain petroleum from its reservoir rocks, how to bring it to the surface and prepare it for shipment, how to care for and remove impurities from the crude petroleum, how to design, construct and operate pipe lines. The book is based on the author's contacts with all the important oil-producing regions of the United States.

741 Pages, illustrated, Price $6.50

Send orders to

The Gulf Publishing Company

P. O. BOX 2608 HOUSTON 1, TEXAS

Frank John has been promoted to director of purchases and assistant to the president of Mid-Continent Supply Company, Fort Worth, with which he has been associated since 1931. Previous connections were as assistant purchasing agent for Tidal Oil Company, and branch manager for Continental Supply Company. His first position with Mid-Continent was as manager of the Kilgore, Texas, store and he later became purchasing agent in Fort Worth.

Frank John

Transplanted Californians Form New York COMINY Club

Someone once said that there are more clubs to the square inch in California than anywhere else, and now the Californians have moved into New York with a new club of oil and equipment men known as COMINY, (California Oil Men In New York).

COMINY seems to be about the best racket we have heard of anywhere, because the organizers and members pay no dues and get free meals and entertainment out of it and the people who dine and entertain them seem to enjoy it. Neat combination.

COMINY was originated by an ex-Californian who at times grew homesick for the climate and environment of the Golden West. Said he to himself and some friends of like expatriation, "Let's form a club of former Californians in the oil business in New York and then when our friends come out to see us here in New York we'll tell 'em about it and take them in." So they did. The "taking in" consists of the visitor entertaining the COMINY club on the budious condition of becoming a member. It would appear that the resident members have all the best of it.

Here is the lineup of resident members as of now: E. W. Berlin, M. H. Hobbs, and G. W. Young, of Standard-Vacuum Oil Company; E. W. Beck, W. P. Cox, R. L. Gollum, of Socony-Vacuum Oil Company; Fred Sealey (he passed himself off as a Texan until COMINY came up), W. H. Farrand, R. M. Morrison, C. E. Olmstead, A. H. Stepney, and Walter Olsen, all of The Texas Company; W. R. Gilbert, Asiatic Petroleum Corporation; Gavin Witherspoon, B. P. Co.; Bob Allen, American Petroleum Institute; Ed Master, Shell Oil Company; Russ McIntire, Baker Oil Tools; Frank Bergeron, Baash-Ross Tool Company; Ben Hilliard, of Byron Jackson Company, International Cementers, and Patterson-Ballagh Division; Herb Maland of R. J. Eiche; F. J. Olsen, International Derrick & Equipment Company; Giff Leece, Gardner-Denver Pump Company; Sto Beckley, Brown & Beckley; Lynn Timbs, The National Supply Company.

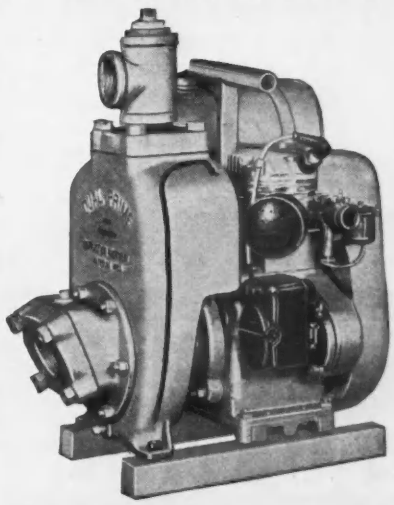
Claude L. Withers, formerly with Allied Oil Company, St. Elmo, Ill., has been elected vice president of the New Mexico Asphalt & Refining Company and placed in charge of its refinery at Artesia, N. M. He succeeds **Dale C. Fishbeck,** who resigned to join Phillips Petroleum Company at Bartlesville, Okla. Withers has also been placed in charge of the Artesia Pipe Line Company, a subsidiary unit that supplies crude for the Artesia plant.

Robert Matteson, supervisor of the analytical division of Richmond Laboratories of the California Research Corporation, has been elected chairman of the California section of the American Chemical Society for 1947, succeeding **Dr. Louis B. Howard** of the Bureau of Agricultural and Industrial Chemistry of the U. S. Department of Agriculture. Matteson has been a member of the California Section of the Society since 1940.

CMC PUMPS

Handy—Portable—Large Capacity
LIGHT WEIGHT CENTRIFUGALS

Pump illustrated, Model 8A, weighs only 115 pounds. Capacity to 8,000 gallons per hour . . . fast priming. Powered with single cylinder 4 h.p. engine. Compact . . . convenient carrying handle. One of the complete CMC Line of Centrifugals from 1½" to 10" size; also High Pressure and Diaphragm Pumps. Get new Pump Bulletin.



CONSTRUCTION MACHINERY COMPANIES
WATERLOO, IOWA
Oil Field Offices:
1232 E. 18th, Tulsa, Oklahoma • 1903 Blodgett, Houston 4, Texas
Specializing in High Pressure Centrifugals . . . Dual Prime Centrifugals
Diaphragm Pumps for the oil field!

Dr. H. N. Fisk, professor of geology at Louisiana State University, spoke before the Houston Geological Society December 18 on "Geology of the Lower Mississippi Valley."

»

Harry R. Carpenter has become special sales representative of The National Supply Company in the Midwest division. He has been in the oil industry 33 years, and was formerly division manager of Jarecki Manufacturing Company. His office will be in Bartlesville, Okla., his headquarters since 1915.

Andrew Richardson, employe of Thermoid Company for 26 years, has been appointed head of factory personnel relations. **Tom Holden** is now head of the employment office, replacing **Ferd Hanauer,** who has become personnel assistant to **W. H. Hall, Jr.**

»

J. F. Bechtle, refining and chemical construction equipment specialist, has been made Eastern sales representative for Texas Electric Steel Casting Company at Houston. His headquarters will be in New York. He was associated with M. W. Kellogg Company from 1923-43.

C. B. Kluppel has been appointed chief engineer of Turney Manufacturing Company, Houston, and will be in charge of engineering on the power drilling rigs the firm manufactures. He has served as consulting engineer in the oil field division of Clark Bros., Olean, N. Y., and before that was chief engineer for Portable Rig Company, Houston.

C. B. Kluppel

»

Fred Hough, executive engineer of the Southern Counties Gas Company, gave a talk on "Texas Gas for California" before the Santa Maria (Calif.) Oil and Gas Association. He said the job will be a major engineering feat comparable to laying the Big Inch from Texas to the Atlantic seaboard during the war. **Lester Billington,** general foreman of the automotive department for Union Oil Company, discussed gas engine ratings and problems.

»

Edward J. Lewis has been appointed assistant to **W. E. Ireland,** manager of passenger car tire sales of The B. F. Goodrich Company. Lewis, with the company 17 years, has been recently handling sales promotion on passenger car tires, accessories and repair materials, batteries and spark plugs.

Deaths

Frank A. Mechling, 59, of Saginaw, who was drilling superintendent on the first commercial well drilled in Michigan in 1925, died December 12. Mechling was an organizer and officer of the drilling firm, Goll, Graves and Mechling, Inc., until his retirement a year ago.

»

Amos W. Standing, 86, a former director of the Houston Oil Company of Texas and its general manager from 1910 to 1933, died in Houston December 16 after a long illness. He continued to serve on the board of directors of the company after his retirement until a few years ago. In 1940 he was elected a member of the board of Houston Oil Pipe Line Company of Texas, a subsidiary.

»

Charles R. Edwards, 70, president of Houston Engineers, Inc., and oil tool inventor, died of a heart attack December 13. He organized the concern in 1924 after previous experience as an engineer in Kansas and Nebraska, and as shop superintendent for Southern Pacific Railroad, International Marine Iron Works and Mack Manufacturing Company.

»

C. H. Leonard, 52, employe of The Texas Company for 34 years, died while on a deer hunt December 12. He was an accountant in the income tax department.

AS A VALVE SHUTS OFF STEAM . . .
EAGLE LEAD WOOL
shuts off bottom water!
When bottom water threatens to sabotage your wells, you can stop it pronto with Eagle Lead Wool. This finely stranded, metallic wool makes a solid, lasting, watertight seal when tamped into cracks and crevices around the bottom of the hole. Economical Eagle Lead Wool saves you time, oil, money. It's easy to install—comes packed in convenient, 50-pound sacks—is easy to place in special cartridge-shaped Eagle Wire Containers sized to fit all casings. Order through your jobber today!
EAGLE EP PICHER
EAGLE LEAD WOOL
Seals off bottom water —keeps 'em flowing!
These 3 Eagle Bearing Metals meet most requirements . . .
Eagle Dreadnaught—for extreme speed and pressure conditions.
Eagle Outlasta—for medium speed and pressure conditions.
Eagle Durable—for low speed and pressure conditions.
THE EAGLE-PICHER COMPANY
Chicago • Joplin • Cincinnati • Dallas • Kansas City

Carl L. Zak Named Manager of Sales for Pittsburgh Steel

Pittsburgh Steel Company announced the promotion of Carl L. Zak from assistant sales manager to general manager of sales. Zak joined the company in 1945, and before that was for three years secretary of Seamless Steel Tube Institute. He also had six years of sales engineering, inspection and mill scheduling for Globe Steel Company, and another six years with Youngstown Sheet & Tube Company in various sales capacities.

Carl L. Zak

L. A. Ver Bryck will become assistant manager of sales January 1. He has been district manager of sales in the New York office, and will be succeeded in that capacity by Joseph G. Smith, who has been manager of Pittsburgh district sales. Smith will be replaced by Walter D. Schlundt, former district sales manager at Detroit. Edward L. Dull will become Detroit sales manager. He has previously been connected with the company's Chicago office. Assistant district sales manager at Pittsburgh will be Robert W. Mullin.

Worthington Pump Executive Again Heads Diesel Engine Manufacturers

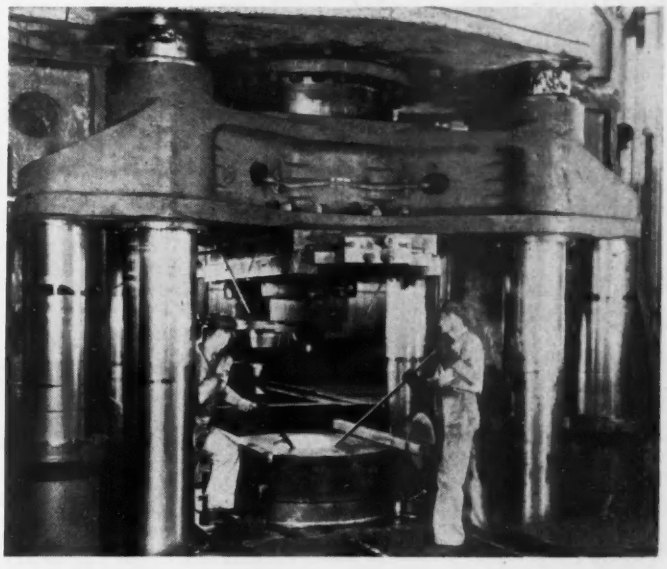
E. J. Schwanhausser, vice president of Worthington Pump & Machinery Corporation, was reelected president of the Diesel Engine Manufacturers Association at the annual meeting in Chicago. J. E. Peterson, vice president of General Machinery Corporation; and Gordon Lefebre, president of Cooper-Bessemer Corporation, were also reelected vice presidents. Robert H. Morse, Jr., vice president and general sales manager of Fairbanks, Morse & Company, was again elected treasurer. Harvey T. Hill, who has been executive director for the association the past three years, was appointed to continue in that capacity.

Directors elected were William E. Corrigan, vice president of American Locomotive Company; George W. Codrington, vice president of General Motors Corporation and general manager of Cleveland Diesel Engine Division; A. M. McKinney, vice president and general manager of sales for The National Supply Company; Robert E. Friend, president of Nordberg Manufacturing Company; Norris H. Schwenk, president of Busch-Sulzer Bros.-Diesel Engine Company; and G. F. Twist, vice president and general manager of Atlas Imperial Diesel Engine Company.

Fairbanks-Morse Building

A new building is to be constructed at the Beloit Works of Fairbanks-Morse & Company for the manufacture of railway diesel-electric locomotives. The plant will be 163 feet wide and 703 feet long and will be one story, 54 feet high, to meet the necessities of locomotive assembly.

Largest Forge of Its Kind in Southwest



The mammoth 5000-ton closed-die hydraulic forge press at the new plant of Cameron Iron Works, Inc., Houston. The press, largest of its kind in the southwest, is shown here forging an oil well casinghead.

Cameron Iron Works Moves Into New Houston Offices and Plant

Cameron Iron Works, Inc., manufacturers of oil well drilling and completion control and other special equipment for the petroleum industry, has moved into new administrative offices and a manufacturing plant at Katy and Silber roads, Houston.

Completion of the new plant was announced by E. L. Lorehn, vice president and general manager.

The main building measures 200 feet wide by 600 feet in length, and houses the company's offices, manufacturing plant and warehouse. A nucleus for the new plant was established in 1942 when Cameron constructed a plant at the Katy Road site to produce three-inch gun barrels for the Navy. At the end of the war it was decided that Cameron's entire facilities would be concentrated there, and construction of the big forge shop was begun.

Prior to moving to the new location, the Cameron plant and headquarters were at 711 Milby Street for many years.

International Harvester Makes Motor Truck Personnel Changes

International Harvester Company has announced several changes in its Motor Truck Division. H. E. Gottberg was ap-

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PAGES 3079 THRU 3098 IN THE COMPOSITE CATALOG

pointed assistant manager of manufacturing. I. W. Davies, former assistant manager of manufacturing, was made manager of the Emeryville, Calif., Works, succeeding A. W. Engstrom, who has resigned to conduct his own business. Gottberg will be succeeded at Indianapolis Works by Albert M. Bowers, general superintendent at Indianapolis, who will be replaced by Robert R. Coulette, Jr.

Separate motor truck branches have been established at Columbus, Ohio; Fort Wayne, Indiana; Little Rock, Ark.; and Davenport, Iowa. The respective branches will be managed by J. L. Teach, W. J. McCahill, H. H. Hedges, Jr., and C. E. Cheney. H. H. Holloway, formerly assistant manager of the Omaha general line branch, has been appointed general line branch manager at Davenport.

Other changes in truck branch management made W. A. Shanahan manager of the Pittsburgh branch; E. M. Moore, assistant motor truck manager at St. Louis; P. C. Johnson, assistant at Houston; E. E. Krogstad, assistant manager at Oklahoma City; T. E. Aughinbaugh, assistant motor truck branch manager at Detroit; W. E. Greene, branch manager at New Orleans; Henry N. Baker, assistant manager at Memphis; F. B. Jennings, assistant manager at San Francisco; W. G. O'Neill, assistant manager at Pittsburgh; B. H. Crawford, assistant manager at Kansas City; R. C. Burns, assistant manager at New York; and P. E. Thomas, assistant manager at Parkersburg, W. Va.

Thermoid Begins Construction Of Utah Manufacturing Plant

The Thermoid Company has started construction of a new manufacturing plant at Nephi, Utah, to be known as Thermoid Western Company. The plant is expected to begin operation in the summer of 1947, and will supply the West Coast and northwestern clients of Thermoid.

Manufacturing will be directed mainly toward production of rubber goods, such as V-belts, conveyor and transmission belting of all kinds, and oil field products. The plant will also produce wrapped hose products such as rotary hose, suction, air and vacuum hose. It is estimated that the plant will be able to produce 12,000 fan belts and 40,000 feet of hose per day.

Advertisers' Index

EDITORIAL INDEX, PAGE 21

* Indicates detailed information on products and services included in 1943-44 edition of Composite Catalog of Oil Field and Pipe-Line Equipment.

American Cyanamid Co. 13
*American Roller Bearing Co. 67
*Baash-Ross Tool Co. 85
*Baldwin-Duckworth Division Chain Belt Co. 22
Wm. M. Barret, Inc. 96
Beaumont Well Works Co. 96
*Bethlehem Supply Co. 79
The Bovaird Supply Co. 61
*The Buda Co. ..... II Cover
Cable & Stine 88
*Cameron Iron Works, Inc. 15
*Chain Belt Co. 22
*Chicago Bridge & Iron Co. ..... III Cover
*Chicago Pneumatic Tool Co. 83
Dan L. Clark Drilling Co. 95
Climax Molybdenum Co. 2
Construction Machinery Companies 93
The Continental Supply Co. 51
*Fred E. Cooper 57
*E. I. du Pont de Nemours & Co. 7
Dynamatic Corp. 3
The Eagle-Picher Co. 94
*Eastman Oil Well Survey Co. 63
*Emsco Derrick & Equipment Co. ..... Insert, 8-9
Ft. Worth Laboratories 96
Garrett Oil Tools 86
*Gaso Pump & Burner Manufacturing Co. 45
The Gates Rubber Co. 9
*The Goodyear Tire & Rubber Co. 1
*Gray Tool Co. 55
*The Gulf Publishing Co. ..... —
Houston Laboratories 96
Houston Lighting & Power Co. 6
J. H. Howard & Co. 96
*Hughes Tool Co. ..... I Cover
*Hunt Tool Co. 65
Industrial Chemicals Division American Cyanamid Co. 13
Jones & Laughlin Supply Co. 5
*Kobe, Inc. 20
*Larkin Packer Co. 41
*The Layne and Bowler Co. 14
*LeRoi Co. 89
A. M. Lockett & Co. 92
*McCullough Tool Co. 8
The Midwest Oil Register 96
*Miller Sand Pump Co. 69
*Mission Manufacturing Co. 87
*The National Supply Co. 18-19
National Tube Co. 17
*The Oil Weekly ..... —
*Oil Well Supply Co. 75
Owen Tool Co. 91
*Patterson-Ballagh Division Byron Jackson Co. ..... 81 and 91
*Pelican Well Tool & Supply Co. 80
*Penberthy Injector Co. 68
*Rector Well Equipment Co. 69
*Reed Roller Bit Co. 77
Republic National Bank of Dallas 82
Sandlin Bros. 78
*Standco Brake Lining Co. 96
Texas Electric Steel Casting Co. ..... IV Cover
*Texasteel Manufacturing Co. 24
Texoma Supply Co. 49
*The Thermoid Co. 12
Trading Post Section 90
*United States Rubber Co. 16
United States Steel Corp. ..... 17 and 75
The Weld Inspection Laboratory 96
*Wheeling Machine Products Co. 96
*Wilson Supply Co. 10-11
Wyatt Metal & Boiler Works 73

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